THE IRON TRADE REVIEW

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SLOW BUT STEADY,

IS IMPROVEMENT IN THE IRON BUSINESS.

Varied Lines Helped by Good Crops—Mexican Central Buys Rails—Wage Settlements Progress.

The prosperity of the farmer continues to be strongly reflected in the improvement of the iron business, which is shown not only in such products as wire, which go directly to the farm, but also in bars used by implement manufacturers, and in the increased activity of railroad shops which are preparing cars to move heavy crops. The improvement is very slow, but nevertheless real, and considering that it comes in mid-summer, when there is almost always a considerable diminution in demand for iron and steel products and decreased activity of mills, is very encouraging. The signing of the wage scale of the Amalgamated Association by a number of important manufacturing concerns has removed the cause of some anxiety and furnished further reason for believing that there will be few, if any, serious wage controversies this summer. The strike of miners in the south is causing some trouble, but has not resulted in the banking of any furnaces.

Pig Iron Conditions

While there are few noteworthy sales of pig iron, there is a strong undertone in the market for foundry grades in the central west, and prices are, for the most part, being well maintained. Some sales of basic have recently been made in the east and a transaction involving 10,000 tons of Bessemer in the Pittsburg district, privately negotiated some time ago, is now announced, but steel making iron is extremely dull and lower prices are named on basic. In the south, a number of interests are willing to sell on a basis of $11.50 Birmingham for No. 2 foundry, but some companies are still holding for $12. The leading pump interest has completed its pig iron purchases to the limit of its requirements.

Mexican Rail Order

The Maryland Steel Co. has received an order for 11,000 tons of standard rails for the Mexican Central railroad. The demand for light rails has improved in nearly all parts of the country. An eastern manufacturing interest has purchased 3,500 tons of billets for early delivery. The more liberal policy of the railroads in making repairs is shown in the improvement in demand for boiler tubes. The demand for wire products is again active. In structural material, a considerable number of orders of fair size have been placed, but business is still far below that of last year.

Coke and Old Material

Some coke is being sold for prompt delivery at low quotations but on contracts, prices are being well maintained. The demand for old material is somewhat stronger and prices are firmer. Dealers are expecting increased demand from the mills at an early date. The leading pump interest has purchased about 5,000 tons of high grade scrap.

WILL BUILD FURNACE.

(Special Telegram).

New York, July 22.—The Worth Bros. Co. is shortly to begin the erection of a blast furnace of 450 tons' daily capacity, 85 foot stack. It will be located adjacent to the Coatesville plant, so that open-hearth furnaces can be operated on hot metal. The contracts are now being let. Other stacks will be erected after this one is finished. Charles Hart is in charge of the construction work, which will be done by the company in New York.

Scattered rail sales of 2,000 tons are reported.

Inquiries are current for 5,000 tons of gray forge iron and 1,500 tons of foundry.

Carnegie Steel Co. bar specifications on books are now 35,000 tons larger than a month ago.

BUSINESS IMPROVES

And Mechanics on Pacific Coast Who Want to Work Can Do So.

San Francisco, July 20.—Work in the iron trades is improving in San Francisco and its vicinity. Word comes from Vallejo, one hour's ride from San Francisco, that the Mare Island navy yard has largely augmented its force lately, and that no mechanic in any branch of the iron trade need be idle if he wants to work. In spite of unfavorable criticism concerning hours, wages and conditions in the navy yard, the jobs in the "yard" are eagerly taken by the men, most of whom prefer working for Uncle Sam to working for any other relative.

The contract for the caisson for the new government dry dock at the navy yard has been awarded to the Union Iron Works of this city, and work commenced on the caisson July 1. The cost of the caisson will be from $75,000 to $80,000, and the caisson will be 670 tons displacement. Thirty-eight bids were submitted for that work to the Schofield Construction Co., which has the contract for the dry dock.

LARGE MACHINE TOOL ORDER.

(Special Telegram.)

New York, July 22.—The Niles-Bement-Pond Co., has received an order from a leading railroad interest for machine tools amounting to $325,000.

WILL BUY RAILS.

Pittsburg, July 22.—The Chesapeake and Ohio R. R. will close Friday for 10,000 tons of rails, which will probably be divided between the leading interest and the Maryland Steel Co.

THE WEEK IN IRON CENTERS

PITTSBURG.

Improvement Slowly Continues—Many Small Mill Orders Received.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., July 21.

The improvement in the marketing of iron and steel products is coming slowly and without the accompanying spectacular features attributed to it by an over-zealous daily press. The gradations of change from week to week are not large and, so far as the whole industry is concerned, are scarcely consistent, since some companies occupy more fortunate positions than others with respect to the limited business now coming upon the market. Though it is not an uncommon expression of belief among iron and steel men that the point of least activity has been passed, there is no disposition to conceal the expectation that the industry has yet to go through a long and severe process before accustomed vigor has been re-established.

Much of the business that is sustaining the operations of the mills at the present time is in the shape of small orders, which, under normal conditions, might have been overlooked in the rush for the larger contracts. As their needs have reached a point demanding some action, consumers are showing a greater determination to push ahead in their business, if only in a modest way, and as far as prevailing conditions will permit. There continues among them however, reluctance as to committing themselves upon any extended future obligations.

Greater activities are being shown by some of the mills. The Carnegie Steel Co. this week is operating 27 blast furnaces against 25 furnaces last week, which was the best record in this respect since last December. The additional stacks were put on at the Edgar Thomson and Clairton groups. The plate, bar and structural shape mills of the Carnegie company, during the first three weeks in July, ran 50 per cent better than the corresponding three weeks in June. The latter as a month showed no marked improvement over the other months of the year which had preceded it. The National Tube Co. has fired idle stacks at Lorain and McKeesport and its percentage of operations is increasing. The Republic Iron & Steel Co., following its wage settlement with the Amalgamated Association of Iron, Steel & Tin Workers, started its steel plant at Youngstown and in a few weeks expects to have its iron mills working at practically the same gait as before its recent shutdown. The agreement reached by the Republic and the Amalgamated Association brought to an amicable adjustment practically all the wage settlements in which the latter organization figures, and to this extent cleared the atmosphere in the iron and steel industry.

Pig Iron.—The market in pig iron exhibits no marked changes but the inquiry increased moderately in the past week. Any gain in interest in the market on the part of buyers appears now to be coming under its own development arising from pure need of material, and to be free of the suspicion of speculation that accompanied the bottom prices a short time ago. Prices generally, under such conditions, are holding firm.

A Canton, O., steel interest closed in the week on its inquiry for 2,500 tons of basic for the remainder of the year. The iron is reported to have gone to a nearby furnace, having a freight advantage over the valleys, at about $15 furnace or $15.50 delivered. The basic inquiry is not heavy, the principal prospective business being from the east. It is now well settled that the 8,000-ton sale reported last week went to the Pittsburg Steel Co. by a three-sided transaction. The Pittsburg Steel Co. now has contracted for sufficient material to operate its new open-hearth furnaces at Monessen, Pa., during August and is expected to have them making steel sometime during the latter month.

Foundry iron for future shipment is well held at from $15 to $15.25 valley furnace for No. 2, but is less firm for prompt shipment. The latter market is about $14.75 valley, although a sale of 200 tons at $14.90 is reported. The inquiry is better. An Ohio car company is in the market for 2,500 tons of No. 2 and malleable and 1,000 tons of low grade iron for delivery this year.

In Bessemer, a sale of 10,000 tons of chill cast was recently made by a valley interest to a Pittsburg steel company at $16 furnace or $16.90 delivered. The iron is for August, September and October delivery. The transaction was privately negotiated and had never been reported. Several thousand tons of malleable in various lots have also been sold in this territory at $15 valley.

The labor situation in the south is throwing some urgent prompt orders for iron upon the market and has prevented the blowing in of several merchant furnaces, as contemplated. A fair amount of southern iron is under negotiation in this and nearby districts, the market being held by makers at from $11.50 to $12 Birmingham.

For third quarter delivery on northern iron, we quote as follows:

Bessemer, valley	$15.75 to 16.00
Bessemer, Pittsburg	16.65 to 16.90
No. 1 foundry, Pittsburg	16.15 to 16.40
No. 2 foundry, Pittsburg	15.90 to 16.15
Gray forge, Pittsburg	14.90 to 15.15
Basic, valley	15.00 to 15.50
Basic, Pittsburg	15.90 to 16.40

Ferro-Manganese.—Owing to considerable tonnage being offered for resale, the prompt market in ferro-manganese is weak and stands at about $43 Baltimore. A carload sale was made this week at about this price. For extended delivery, the market is from $44 to $45 Baltimore or $45.95 to $46.95 Pittsburg. We note the sale of 100 tons to a local foundry interest at a shade lower than $44 seaboard. Prompt ferro-silicon is also weak.

Imported 50 per cent ferro-silicon is quoted $70 Pittsburg on forward deliveries; domestic 12 per cent, $29; 11 per cent, $28; 10 per cent, $27. The lower grades of imported ferro-silicon are upon about the same basis. These quotations are applicable to Pittsburg territory.

Plates.—The general plate market is not showing much improvement, due to the fact that the principal consuming interests are buying sparingly. Mills rolling plates for pipe manufacture are in comparatively good positions, as in the case of the Carnegie Steel Co., because of the strong demand for line pipe material. Several small mills are shading prices. We quote:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120

inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—Encouragement in the sheet situation is to be found from the increased specifications that are coming to mills from both jobbers and consumers. The greater activity applies to all grades, and is from all sections. There is little disposition to contract, however. Operations have slightly increased, but are still less than 50 per cent. We quote:

Black steel sheets, cold rolled, No. 28 gage, $2.50 per 100 pounds, and galvanized sheets, No. 28 gage, $3.55 per 100 pounds, plus the regular extras.

Blue annealed: Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation; and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Tin Plate.—The movement in tin plate is holding closely to normal by reason of the steady specifications from the canning interests. The finished output of the American Sheet & Tin Plate Co. is unchanged, and little significance is attached to the closing of some of the hot mills which had run ahead of the finishing mill capacity. Some of the mills resumed this week, and former activity will gradually be re-established. We quote:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—Conditions in light rails are improving, and the Carnegie Steel Co. has again put in operation its No. 3 mill at the Edgar Thomson works. All the mills are now running "gaited," No. 1 on standards and Nos. 2 and 3 on light rails. The bookings of the week in light rails amounted to 2,000 tons. Specifications in standards show a moderate increase. On present specifications on Bessemer rails, we quote as follows:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28; angle splice bars for standard sections, $1.65; standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—A larger consumption of steel is shown by increased specifications against long time contracts by billet users. New business is not heavy, but occasional transactions are being put through at full schedule prices. A sale of 800 tons was made this week in this territory by an eastern mill. The 3,000-ton Ohio inquiry noted last week has not yet been closed. Sheet and tin bars are being steadily taken on contract. We quote:

Bessemer and open-hearth billets, base sizes, are quoted at $25 Pittsburg, and forging billets at $27 Pittsburg, subject to the division of the freight charge over $1 and not exceeding $3, and sheet and tin bars at $27.50 Pittsburg, valley and Wheeling territory, and $27 Pittsburg for delivery to other points.

Hoops, Bands and Cotton Ties.—The present season of the year is normally quiet, but with the approach of fall, greater activity in hoops and bands is expected by manufacturers. There are no sales of cotton ties. We quote:

Cotton ties, 85c per bundle Pittsburg, plus the freight on lots of 3,000 bundles or more, and 88c per bundle Pittsburg for less than 3,000 bundle lots.

Hoops in carload lots, 1.80c; in less than carload lots, 1.90c; bands, 1.40c, base half extras as per standard steel.

Merchant Bars.—The great tonnage of steel bars placed under contract by makers in the past month has strongly entrenched them as to the future, as far as bookings go. The total contracts taken by some companies represent practically a full six months' capacity of their bar mills, provided the entire tonnage is specified. At present specifications are being received in a very satisfactory amount. The settlement by the Republic Iron & Steel Co. of the annual wage scale with the Amalgamated Association of Iron, Steel and Tin Workers was followed this week by the starting of the company's steel works at Youngstown. The nine iron mills will resume at intervals within the next week and by Aug. 1 the company expects to be operating its properties at a slightly greater extent than at the time of its shut-down a month ago. The bar iron market is dull. Firmness is displayed in shafting and a moderate amount of business is moving. We quote:

Common iron bars, 1.40c Pittsburg in carload lots and over; 1.45c in less than carloads; 1.32c to 1.35c base Pittsburg plus freight to point of shipment on western deliveries; Bessemer steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3 inches, 1.50c; all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting 56 per cent in carloads, and 52 per cent less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.80c base. Iron finished tire under 1½ by 1½ inches, 1.75c; iron finished tire, 1½ by 1½ inches and over, 1.60c. All tire subject to ½ extra on the steel card.

On cold rolled strip steel, width 1½ inches and wider and 0.100 inch and thicker, we quote base prices per 100 pounds, $3.35 on hard and $3.60 on soft.

Structural Material.—The business being taken by the mills is largely of the small order variety, but this aggregates a volume that is warranting favorable mill operations. Large single specifications are rare. The fabricating trade shows no improvement as to prices, and the work that is emerging from estimators' hands is not of large volume. A project which is soon expected to come into the market for steel is that of a new highway bridge to be erected jointly by Allegheny and Washington counties, which will require upwards of 2,500 tons. We quote: Beams and channels, 15-inch and under, 1.60c; over 15 inches, 1.70c; zees, 1.60c; tees, 1.65c; angles from 3 to 6 inches, 1.70c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—Prospects and actual business taken in tubular goods are of an encouraging nature. A large number of small orders are being taken in merchant pipe and line pipe. June was the best month of the year for manufacturers and bookings in July are sustaining this record. A transaction of the week was the closing by the Barnsdall interests for seven miles of 6-inch and smaller gas line pipe for Ohio points. An inquiry for 10 miles of 3, 4 and 5-inch iron pipe is also out. The National Tube Co. has put in additional blast furnaces at Lorain and McKeesport and is operating about 55 per cent of capacity. The Youngstown Sheet & Tube Co. resumed operations this week at full capacity in all departments. In cast iron pipe there is an inquiry in the market for 1,400 tons for a water line in the coke regions. We quote the following official base discount, with an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
¾ to 6 inches....	75	65	73	63

Boiler Tubes.—The market in boiler tubes has a better tone and appears stronger in that manufacturers are acting more uniformly in respect to prices. We quote the following official base discount to the general trade:

BOILER TUBES.

	Iron.	Steel.
2¼ to 5 inch.....	52	65

Wire Products.—The expiration of contracts at this time of the year is bringing a number of wire buyers into the market, and there is more activity discernible. Confidence in the stability of present prices is constantly growing stronger. Wire nails are not so active. We quote:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15 with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Wire Rods.—Manufacturing consumers of wire products are buying cautiously, and in wire rods the business is moderate. We quote $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.—Operations in the coke region are being somewhat affected at this time by a scarcity of water which has proceeded from an absence of normal rain fall. Some companies have resorted to running in tank cars from other points to supply their needs. The situation has now been somewhat relieved, and unless a prolonged drought prevails no serious curtailment of activity is anticipated. Some shortage of labor in the mines has also appeared, owing to many of this class of laborers having left the region. A good demand for crushed coke for domestic fuel purposes has developed, and a considerable tonnage is being sold. As a result, the Pittsburg Gas & Coke Co. has started its crusher at Glassport and is operating day and night. Crushed coke of the 72-hour Connellsville variety is selling at about $2 ovens. Specifications for foundry coke are in good volume, especially from the west, where the excellent prospects of the harvester interests are having a beneficial effect. We quote standard Connellsville foundry coke at from $2.00 to $2.25 ovens, and standard Connellsville furnace coke from $1.65 to $1.85 ovens, the lower quotations being for prompt shipment. Statistics compiled by the *Courier* for the week ending July 11, show 17,527 ovens in blast with an output of 174,729 tons, corresponding to 16,225 active ovens and a production of 165,472 tons the previous week.

Old Material.—Responding to an active campaign by dealers for material in anticipation of greater demand from the mills soon, as well as a slightly increased buying movement on the part of the mills themselves, old material prices in general have advanced and the market is stronger. Steel scrap and re-rolling rails especially are in demand and are commanding higher prices. Though the tone of the market is undoubtedly better, not much support is given to it yet by a consistent demand from the principal consumers in this district. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $14.50 to $15.00; rerolling rails, $15.50 to $16.00; bundled sheet scrap, $11.50 to $12.00; iron axles, $20.00 to $20.50; old iron rails, $16.00 to $17.00. No. 1 wrought scrap, $14.00 to $14.50; old car wheels, $14.00 to $14.50; low phosphorus, $18.00 to $18.50; machine shop turnings, $8.50 to $9.00; cast borings, $8.50 to $9.00; No. 1 cast scrap, $14.00 to $14.50.

The Acetylene Welding Co., 625 West Fifty-seventh street, New York City, has been formed to weld metals, cut structural steel and steel plate, do brazing work and repair defective and broken castings by the oxy-acetylene process. Edward A. Miller is president. A complete equipment is being installed, the acetylene outfit being furnished by the Davis-Bournonville Acetylene Development Co., 90 West street, New York. A general jobbing business will be carried on, and considerable work is already being handled.

CHICAGO.

Agricultural Prosperity Helps, But Some Unsatisfactory Conditions Remain.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, July 21.

The week in this market was very quiet. Bright spots may be found in more directions than appeared 30 days ago, but much that is unsatisfactory still obtains. The agricultural prospect continues bright and, in its effects on the wire products trade, bars, car repairing and pig iron specifications, is responsible for substantially improved conditions.

Pig iron generally is very quiet with sagging prices. The almost complete absence of requests to delay shipments is however, an encouraging feature, but from all appearances a marked increase in the melt must develop before any further enlivening of the pig iron market may be expected. There is little change to record in the various lines of finished material. Buying from local stocks has improved somewhat and, in response to this, jobbers seem to be increasing the size of the stocks they are carrying, which has added slightly to the volume of mill specifications. These increases are very small but in the right direction. The significant feature of the week's lettings of structurals has been the fact that better prices have prevailed uniformly. The scrap market is strong in several directions, apparently supported for the most part by the demand locally for old steel rails. It is understood that the 2,500 tons of old steel rails offered by one of the railroads this week brought better than $16, a part going direct to consumer.

Pig Iron.—A report comes from the south that a new pipe interest taking over some old plants has purchased 10,000 tons of iron in the last few days, but confirmation of this is lacking. In other directions, the week has been exceedingly quiet. While not without a run of numerous small sales from carloads up to a few hundred tons, the week's aggregate buying has been below the average and inquiry also is unsatisfactory. The coal strike in the southern fields grows more serious and gives promise of considerable trouble. Induced by a reduction in wages put in force at the commercial mines, the strike involves sympathetically the union men employed in the mines belonging to the furnace interests. No stoppage of furnace operations has been caused as yet. The price of southern iron has not changed perceptibly from a week ago. Furnaces in northern Alabama and Tennessee will undoubtedly sell iron for last half delivery on the basis of $11.50 for No. 2 Birmingham. Some of the Birmingham furnaces are credited with selling at $11.75 for No. 2 for prompt shipment, but no actual sales have been reported where less than $12 has been done by them. The Republic Iron & Steel Co. now has its entire capacity, three stacks, in blast and is understood to have taken a fair tonnage of iron in the last 20 days. The new 300-ton Woodward furnace has been blown in and is running on basic, 40,000 tons of its output having been sold to the account of Hickman, Williams & Co. Locally the pig iron situation is moving slowly. A very fair tonnage is being shipped on contract, but new orders for important quantities are few and far between. Where there is any competition, it is not likely that local irons are bringing more than

$17 at the furnace. We quote as follows:

Lake Superior Charcoal	$19.50 to 20.00
Northern Foundry No. 1	17.50 to 18.00
Northern Foundry No. 2	17.00 to 17.50
Northern Foundry No. 3	16.50 to 17.00
Southern Foundry No. 1	16.35 to 16.85
Southern Foundry No. 2	15.85 to 16.35
Southern Foundry No. 3	15.35 to 15.85
Southern Foundry No. 4	14.85 to 15.35
Southern No. 1 Soft	16.35 to 16.85
Southern No. 2 Soft	15.85 to 16.35
Southern Gray Forge	14.35 to 14.85
Southern Mottled	15.10 to 15.60
Southern Silveries, 4 per cent Silicon	17.85 to 18.35
Southern Silveries, 5 per cent Silicon	18.35 to 18.85
Southern Silveries, 6 per cent Silicon	19.35 to 19.85
Jackson Co. Silveries, 6 per cent	19.90 to 20.40
Jackson Co. Silveries, 8 per cent	20.90 to 21.40
Jackson Co. Silveries, 10 per cent	21.90 to 22.40
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	18.25 to 18.75
Alabama Basic	16.35 to 16.85

Bilets and Rods.—The character of billet transactions is unchanged and there is nothing more than this fact to be stated. Reports are to the effect that specifications for wire rods on contracts are improving and some additional contracting is being done. Prices are firm and we quote rolling billets $26.50, and forging billets $28.50 base, Chicago. We quote f. o. b. Pittsburg, Bessemer wire rods, $33; open-hearth, $34; and chain rods, $33.

Merchant Bars.—The announcement that the Republic Iron & Steel Co. has reached an agreement with the Amalgamated Association is the probable forerunner of resumptions at the various mills of the company in the immediate future. While no advices have been reached with regard to starting up, it is believed this will take place next week. During the general period of mill shut downs, the accumulation of specifications has not been in the quantity expected, but at this writing orders are being received in fair volume. One contract is reported for 4,000 tons of steel bars by the principal producer and other manufacturers have among their shipping orders some specifications of fair tonnage. Despite the improvement which is unmistakable, the volume of mill business is far from large and rolling schedules are light. Store business shows a substantial increase and jobbers are beginning to enlarge slightly the much-depleted stocks that have been carried for many weeks past. We quote for Chicago delivery as follows:

Bar iron, 1.50c to 1.53c; soft steel bars and bands, 1.58c, half extras; soft steel angles, less than 3 x 3, 1.68c; hoops, 1.98c base, full extras; planished or smooth finished tire steel, 1.78c; iron finish, up to 1½ x ½-inch, 1.73c base tire card; iron finish, 1½ x ½-inch and larger, 1.58c base steel card; channel for solid rubber tire, ¾ to 1-inch, 2.08c, and 1⅛-inch and larger, 1.98c; smooth finished machinery steel, 1.83c; flat sleigh shoe, 1.63c; concave and convex sleigh shoe, 1.83c; cutter shoe, 2.05c; toe calk steel, 2.13c; railway spring, 1.93c, base steel card; vehicle spring steel, 1.98c base, vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 56 per cent off the list for carload lots, and 52 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.90c to 2c, full extras; soft steel bars, 1.80c per 100 pounds base, plus half extras; soft steel hoops, 2.30c, full extras.

Plates.—It is difficult to find any change in the plate situation. Some orders for tank plate and small jobs are received in the routine manner, but the volume of business is insignificant. We quote without change as follows:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.78c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; from 72 to 96 inches wide, 2.10c to 2.20c; 3/16-inch up to and including 60 inches wide, 2.10c to 2.15c; 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.10c to 2.15c. Flange and head quality, 25c extra.

Sheets.—During the idleness of some of the sheet mills, those which have remained active are receiving slightly increased business and orders from unaccustomed sources. The local independent mill continues to operate only four out of 10 mills, but in one department has rolling orders for several weeks ahead. Instances are frequently reported showing the extremes to which consumers have gone in refraining from buying until absolutely necessary. With some of the mills down, and in one case with the steel making department of the plant idle, deliveries cannot be made promptly, which is not at all in keeping with the demand for immediate delivery which accompanies practically all specifications. Prices are none too firm and a shading of $1 a ton is not infrequently encountered in mill business. We continue to quote store prices as follows. For mill prices see Pittsburg report:

No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18-20, 2.60c to 2.65c; Nos. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, No. 10 to 16, 3.05c to 3.10c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No. 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—The volume of structural steel business is so small that at this, the naturally dull time of the year, there has been no noticeable falling off at all. The thread of business is about as fine as it can be and still support itself. It is noteworthy, however, that the contracts placed during the past week were at materially better prices than have ruled for some time. Not enough business was placed, however, to indicate whether this was a circumstance or indicative that fabricators had taken all of the low priced contracts desired. The principal contracts placed were 2,950 tons by the Chicago & Northwestern railroad, 2,200 tons going to the American Bridge Co. and 750 tons to the Pennsylvania Steel Co. The larger tonnage is for miscellaneous work and the smaller for track elevation in connection with the terminal station. The contract for the Nelson Story building at Los Angeles, Cal., for 2,262 tons was awarded to the Llewellyn Iron Works of that city. In addition to the contract mentioned above, the American Bridge Co. took 1,162 tons of miscellaneous small orders. The United States Export Co. undertook to furnish 55 tons of steel for the Paahua Sugar Co., Hawaiian Islands. Aside from the apparent betterment of bid prices, the market was without important incident. We quote for Chicago delivery as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.78c to 1.81c delivered Chicago. For extras see Pittsburg report. Quotations from store are as follows for carload lots and over:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.05 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base; channels, 3 inches and larger, $1.95 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—With the exception of the contract for 10,000 tons of rails for the Mexican Central Railway, which, however, was not placed in this territory, the rail inquiry for the week was quiet. Light rails are in fair demand, with a slight improvement in the price sit-

uation in the west. Comparatively, there is greatest activity in track supplies and one order for 3,000 kegs of track bolts is reported. Most of the railroad activity is being directed toward the repairing of rolling stock. We quote as follows:

Standard rails, $28 f. o. b. mill, full freight to destination; light rails, 25-pound to 45-pound, $28; 20-pound, $29; 16-pound, $30; 12-pound, $31. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.20c to 2.25c; with hexagon nuts, 2.35c to 2.40c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Cast Iron Pipe.—The municipal lettings for cast iron pipe for the week past aggregated only 850 tons, all of which was taken by the United States Cast Iron Pipe & Foundry Co. and included 600 tons for Mansfield, O., and 250 tons for Newton Falls, O. There is in prospect for the next few days about 1,800 tons, of which 500 tons is at West Branch, Mich., 300 tons at Burlington, Wis., and 1,000 tons for Milwaukee County, Wis. Prices are slightly firmer, but we quote without change as follows: 4 to 6-inch, $27; 6 to 16-inch, $26, larger sizes, $25; gas pipe $1 a ton higher.

Merchant Pipe and Boiler Tubes.—The repairs being undertaken by the railroads include the locomotive equipment and in this connection the demand for locomotive boiler tubes is somewhat improved. Steel pipe shows some gains, but the change for the better is little more than discernible.

We quote mill discounts, Chicago delivery, carload lots, as below. On steel pipe jobbers are allowed a concession of one point and 5 per cent additional from the schedule in force.

	—Steel— Black.	Galv.
¾ to 6 inches, inclusive.....	73.2	63.2
7 to 12 inches, inclusive.....	70.2	55.2
BOILER TUBES.		
	Steel. Iron.	Seamless.
2¼ to 5 in., inclusive....	63.2 50.2	50.2

Mill quotations on iron pipe are three points higher than the foregong prices.

We have revised our prices from store, as below. A concession of one-half to one point from these prices is allowed by Chicago jobbers on carload orders shipped from local stocks. We quote for less than carload lots as follows.

MERCHANT PIPE.

	—Steel— Black.	Galv.
⅛ to ¼ inch.....	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches.....	73	63
7 to 12 inches.....	69	54

Store prices for wrought iron pipe, carload lots, from Chicago stock, are as follows: One-eighth to ¼-inch, 61c; ⅜-inch, 63; ½-inch, 65; ¾-inch to six inches, 70; 7 inches to 12 inches, 67. Boiler tubes from store are unchanged at 60 off.

Wire Products.—This department of the market is again one of the most active factors. A large and increasing trade is reported in all materials and conditions are looked upon as being very good. Barb wire and wire nails are moving in quantity and the close of last week saw one day of unusually large business. We quote as follows:

Wire nails, $2.13; painted barb wire, $2.28; galvanized barb wire, $2.58; smooth annealed wire, $1.98; smooth galvanized wire, $2.28; polished staples, $2.23; galvanized staples, $2.53. Carload lots to retailers, 5 cents higher; less than carload lots, 15 cents higher.

Coke.—Outside of the routine buying of coke there is little of importance to report. Prices are holding firm on the dull situation and we quote for standard Connellsville grades, furnace $1.85 to $2 and for foundry coke $2.25 at the ovens.

Old Material.—The upward tendency inaugurated in this market through the influence of eastern buying has strengthened under some local inquiry from mills and foundries. Several large inquiries for cast scrap from a large car foundry, a manufacturer of fittings and an implement manufacturer are reported. Purchases have already been made to cover a part of this. Despite the advance in price, however, the immediate consumptive demand is very limited and a discounting of future mill requirements has much to do with the strength of the market. Railroads are receiving good prices for material offered and it is understood that over $15 was bid for rerolling rails today and over $16 for old angle bars. Lists aggregating 8,400 tons, 5,000 tons from the Illinois Central R. R. and 3,400 from the Chicago, Burlington & Quincy are in the market, the Illinois Central list including 2,500 tons of old steel rails. We have changed our prices and quote, gross tons in the first paragraph as follows:

Old car wheels.....	$14.00 to 14.50
Old iron rails.....	16.25 to 16.75
Re-rolling rails (3 ft. and over)..	14.50 to 15.00
Old steel rails (3 ft. and under)	13.00 to 13.50
Light section relayers, 45 lbs. and under, subject to inspection...	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards.....	12.50 to 13.00
Heavy melting steel	12.25 to 12.50

We quote, net tons, as follows:

No. 1 R. R. wrought.....	$12.25 to 12.75
No. 2 R. R. wrought.....	11.25 to 11.75
Knuckles, couplers and springs...	11.50 to 12.00
Shafting	15.00 to 15.50
Iron car axles	17.25 to 17.75
Steel car axles	16.00 to 16.50
Dealers' forge No. 1.....	9.75 to 10.25
Pipes and flues	9.00 to 9.50
No. 1 cast, 150 lbs. and less....	12.25 to 12.75
No. 1 mill	7.00 to 7.50
Mixed busheling (Nos. 1 and 2)	7.50 to 8.00
Country sheet	4.50 to 5.00
No. 1 boiler cut.....	8.25 to 8,75
Boiler punchings	10.50 to 11.00
Cast borings	4.75 to 5.25
Mixed borings, etc.....	5.00 to 5.50
Machine shop turnings	5.75 to 6.25
Agricultural malleable	10.75 to 11.25
Agricultural malleable	10.50 to 11.00
Stove plate and light cast scrap	10.50 to 11.00
Old iron splice bars.....	15.50 to 16.00

CLEVELAND.

Strong Undertone in Foundry Pig Iron—Ore Movement Slow.

Office of THE IRON TRADE REVIEW,
Browning Building, July 21.

Iron Ore.—Ore shipments are being made very slowly, and vessels are having difficulty in obtaining cargoes. Some have gone out of commission, and others are likely to do so. Sales of ore are being made, but the market is sluggish, and furnace interests are showing little disposition to contract. On base ores, with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; and Mesabi non-Bessemer, $3.50.

Pig Iron.—There is a stronger undertone in foundry iron, and buyers are showing more interest, but sales are neither numerous nor in large quantities. The total, however, for the first three weeks of July will compare very favorably with any similar period since the first of the year. Steel making irons are extremely dull, the only sale of any quantity reported being for 2,000 to 3,000 tons to a Canton, O., concern, which is understood to have been disposed of at a figure considerably below recent quotations. We quote as follows:

Bessemer	$16.55 to 16.90
No. 1 foundry.....	15.75 to 16.25
No. 2 foundry.....	15.60 to 15.75
No. 3 foundry.....	15.25 to 15.50
No. 2 southern.....	15.85 to 16.10
Gray forge	14.50 to 15.00
Lake Superior charcoal.....	19.50 to 20.00

Coke.—Very few transactions are reported in either furnace or foundry grades. We quote on contracts furnace coke $1.70 to $1.85, and foundry at $2.25.

Finished Material.—Some improvement in specifications is noticeable, and there is also a slight increase in buying. On the whole, conditions are more favorable. The contract for the new store building of the Bailey Co. has been awarded to the Reaugh Con-

struction Co., and the structural steel work, involving about 1,000 tons, will be done by the Forest City Iron & Steel Co. A large number of buildings are being erected, but very few of them require any considerable tonnage of iron and steel.

Old Material.—The steel portion of the market continues strong as to price and several small railroad lists closed last week with no falling off in price. Dealers appear to be taking all available steel material offered and some shipping is being done. Rolling mill material does not keep pace with the steel portion of the market. No changes are noted in prices this week and we continue to quote f. o. b. Cleveland as follows:

Old iron rails	$16.00 to 16.50
Old steel rails (re-rolling)	14.50 to 15.00
Old steel rails (under 6 ft.)	14.00 to 14.50
Old car wheels	14.00 to 14.50
Old steel boiler plate	12.00 to 12.50
Steel axles	18.00 to 18.50
Malleable iron (railroad)	13.00 to 13.50
Malleable iron (agricultural)	11.50 to 12.00
Heavy steel	13.50 to 14.00
Country mixed steel	12.00 to 12.50
Low phosphorus	16.00 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	12.50 to 13.00
No. 1 busheling	11.00 to 12.00
No. 1 machine cast	12.00 to 13.00
Iron axles	17.00 to 18.00
Axle turnings	9.00 to 9.50
Machine shop turnings	6.50 to 7.00
Grate bars	9.00 to 10.00
Pipes and flues	10.00 to 10.50
Tank iron	10.50 to 11.00
Hoop and band iron	7.50 to 8.00
Sheet iron	4.25 to 5.25
Wrought drillings	6.50 to 7.00
Stove plate	10.50 to 11.00
Cast borings	6.00 to 6.50

CINCINNATI.

Little Interest in Pig Iron—Some Fair Inquiries.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., July 21.

Pig Iron.—The market remains listless so far as the rank and file of furnaces and consumers are concerned. A few furnaces are willing to accept $11.50 Birmingham for No. 2 foundry, and by placing this price in the hands of their selling agents have been able to book some business which has been put through in a quiet way; and a good part of the tonnage sold was the result of special efforts and not on general inquiries. This makes it appear that more iron is selling in a quiet way than the situation is given credit for, although the total volume of business is not large. Some of the larger producers in the south are indifferent, are declining to shade $12 Birmingham, and refuse to accept firm offers at anything under their schedule. Northern irons remain steady, although $15 for No. 2 foundry at southern Ohio furnace has been shaded. The principal inquiry comes from a manufacturer in southern Ohio for 1,250 to 2,500 tons of malleable and 500 to 1,000 tons of northern gray forge, for delivery six, four, or three months from Oct. 1. The inquiry from a local consumer for 2,000 tons is still pending. An Ohio manufacturer is negotiating for 3,000 tons of special iron for steel making purposes for delivery in the last four months of the year. A large consumer is asking for prices on 1,000 tons, 500 tons northern and 500 southern, for August and September delivery. There has been some quiet purchasing in Michigan territory of southern foundry iron, and a large consumer has taken 2,500 tons of southern iron during the week. The general situation is but little changed. There is some shopping by small consumers, but sales agencies find a disposition to defer order placing, either through lack of confidence in the future or uncertainty as to the tendency of present prices. We quote for third quarter delivery, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, as follows:

	PER TON
Southern foundry No. 1	$15.25 to 15.75
Southern foundry No. 2	14.75 to 15.25
Southern foundry No. 3	14.25 to 14.75
Southern foundry No. 3	14.00 to 14.25
Southern No. 1 soft	15.25 to 15.75
Southern No. 2 soft	14.75 to 15.25
Southern gray forge	13.75 to 14.00
Northern No. 1 foundry	16.70 to 17.20
Northern No. 2 foundry	16.20 to 16.70
Northern No. 3 foundry	15.70 to 16.20
Northern 8 per cent silicon	19.70

Finished Material.—Jobbers report business quiet and prices unchanged. Mill orders are light and specifications on contracts moderate. Jobbers fill their small orders here at the following prices:

Iron and steel bars, 1.85c to 2c, full extras. Angles, 3 x 3 and over, 2.10c to 2.25c; beams and channels, 15 inches and under, 2.10c to 2.25c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16-inch, 2.10c; No. 8, 2.15c; sheets, blue annealed, No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; box annealed sheets, Nos. 18 and 20, 2.55c to 2.65c; Nos. 22 and 24, 2.65c to 2.75c; Nos. 25 and 26, 2.70c to 2.80c; No. 27, 2.75c to 2.85c; and No. 28, 2.85c to 2.95c; boiler tubes, 2¼ to 5 inches, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3c base; cold rolled shafting, 47 to 50 per cent off list; steel tire, 2.05c to 2.10c base.

Coke.—In some districts there is a disposition to offer prompt shipment coke at lower prices, as there is some accumulation to be worked off; but the well-known brands are firmly held at previous prices. There is no change in the schedule for contracts. We quote contract prices in the leading coke producing districts as follows:

	PER TON
Wise county furnace coke	$1.60 to 1.85
Wise county foundry coke	2.10 to 2.25
Pocahontas furnace coke	1.75 to 1.85
Pocahontas foundry coke	2.00 to 2.25
Standard Connellsville furnace coke	1.85 to 2.00
Standard Connellsville foundry coke	2.25 to 2.40
Connellsville district furnace coke.	1.60 to 1.80
Connellsville district foundry coke.	2.00 to 2.25

Old Material.—The market is quiet and without quotable change. Dealers are well stocked, and the demand from melters is meager. We quote dealers' prices to melters as follows:

Old No. 1 R. R. wrought, net tons	$11.00 to 12.00
Cast machine and fdy., net tons.	12.00 to 12.50
Old iron rails, gross tons	13.50 to 14.00
Old steel rails (re-rolling) gross tons	12.75 to 13.25
Old short lengths, gross tons	12.00 to 12.50
Old iron axles, net tons	15.50 to 16.50
Heavy melting scrap, gross tons	12.00 to 12.50
Stove plate, net tons	9.50 to 10.50
Wrought turnings	5.00 to 6.00
Cast borings, net tons	4.00 to 4.50
Car wheels, gross tons	13.00 to 14.00

BUFFALO.

More Demand For Pig Iron in Small Quantities.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, July 21.

Pig Iron.—Tonnage is more in demand this week and slightly better conditions are reported, although no advance in prices has been made. Quotations can only be approximated at the present time. Sales, while more numerous, are still of a small character. Inquiries have picked up perceptibly the past week, but the big consumers are not in the market. The buyers of small tonnage find prices vary according to quantity and delivery. We quote f. o. b. Buffalo as follows:

No. 1X foundry	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable Bessemer	16.00 to 17.30
Gray forge	15.00 to 15.50
Charcoal	20.25 to 20.75

Finished Material.—There is little activity in this market. Better conditions are looked for in the near future. The Jones & Laughlin Steel Co. had the low bid for furnishing 650 tons of fabricated structural material for the Bailey avenue viaduct, this city, and was awarded the contract. The Kellogg Co. will furnish 150 tons of fabricated for the United States marine hospital which is to be built here. They were low bidders.

The Radford, Va., stack of the Virginia Iron, Coal & Coke Co., has been blown in after an idleness of six months.

ST. LOUIS.

Numerous Plants Resuming and Many More Men Employed.

July 20.

Pig Iron.—Manufacturers and manufacturers' agents in the St. Louis territory confidently expect a buying movement in pig iron to begin within the next 30 days. Today's prices are firm at $12 as the minimum for No. 2 Birmingham. The coal strike in Alabama is assuming more serious proportions than was anticipated by the St. Louis dealers in pig iron, and may have the effect of advancing prices for spot iron. A few furnaces have been inconvenienced for spot coal and coke. Inquiries for pig iron were about the same as the previous week, and no new contracts of magnitude were reported. The largest single inquiry was for 500 tons, and inquiries for single car lots of 100 tons made up an aggregate of from 1,300 to 1,400 tons for shipment over the remainder of the year and the first quarter of next year. Our quotations delivered, to which the freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$16.25 to 16.75
No. 2 southern	15.75 to 16.25
No. 3 southern	15.25 to 15.75
No. 4 southern	14.75 to 15.25

Within the next 30 days, it is believed that all or nearly all of the large factories and foundries in Southern Illinois, which have been closed for some time, will be reopened, and fully 15,000 men will be given employment. This information is given out by the Commercial Club of East St. Louis, which has been gathering data. According to the club's information, the Federal Lead Co. resumed operations Monday with 500 employes; the Standard Oil Co. at Wood River with 600 men; the Duncan Foundry Works with 150 men; the Beall Pick & Shovel Co. with 200 men, the full force of the plant. The tri-cities—Madison, Granite City and Venice, in which are some of the largest factories in Illinois, have already felt the return of normal conditions.

The Republic Iron & Steel Co. will start up its Tudor Rolling mill in East St. Louis, the largest plant of the company about Aug. 1. Superintendent Thos. Cunningham has instructed his secretary to notify the 2,200 men employed there to report for work at the time specified.

The N. O. Nelson Mfg. Co. plant at Leclaire, Ill., which has been working its 300 men on half time, will resume operations on a normal basis this week and use its employes on full time. The National Stamping & Enameling Co., which has two foundries at Granite City, will reopen with a full force of 4,000 men. The plants have been closed for repairs.

The American Car & Foundry Co., the Commonwealth Steel Co. and the Helmbacher Forge Co., three of the largest employers of labor in the tri-cities, will resume operations with full complements of men within a few weeks.

Coke.—Prices remained unchanged last week, although the demand for coke was better and customers asked for increased shipments. The best selected 72-hour Connellsville foundry coke is quoted at $2.15 to $2.50 a ton, ovens, for immediate and future shipment; high sulphur coke can be bought as low as $1.45 a ton ovens; 48-hour furnace coke, Connellsville, $1.60 to $2 a ton, ovens. Virginia and West Virginia coke is held at $2.25 to $2.75 for foundry grades and $1.60 to $2 for furnace. The freight rate to East St. Louis is $2.80 and to St. Louis $2.90 a ton.

Finished Material.—No new buildings have been reported in contemplation, but it is believed that, with the opening of the mills and factories on the east side of the river, St. Louis will experience a revival in building operations.

Old Materials.—Our quotations remain the same as last week, but dealers are hoping that a better outlook is not far off. Our prices are as follows:

Cast iron borings, free from foreign material, net ton	$ 4.50
Steel axle turnings, net ton	8.00
Steel railroad axles, net ton	13.50 to 14.00
Iron railroad axles, net ton	15.50
Miscellaneous steel scrap, gross ton	9.75
Old car wheels, gross ton	14.00 to 14.50
No. 1 railroad cast scrap, net ton	10.50
Heavy machinery cast, net ton	11.50
Stove plate and light cast, net ton	9.00
Sheet iron, net ton, uncut	3.00
No. 1 railroad wrought, net ton	10.00 to 10.50
Railroad malleable, net ton	11.00
Heavy melting steel, net ton	10.00

PHILADELPHIA.

Prices Well Maintained in a Dull Market.

Office of THE IRON TRADE REVIEW,
408 Central Trust Bldg., July 21.

Pig Iron.—In a dull market normal to this season of the year, it is an encouraging sign that producers are able to maintain prices firmly. Record was made last week of the fact that some furnaces declined to consider any prices below $16.75 for No. 2X. They have since raised the minimum to $17, which they find no trouble in obtaining. This does not hold true of all sellers, but is none the less a hopeful sign of improvement. Sales of northern iron have been rather light, with the exception of one transaction on basic, where an eastern mill is reported to have bought 10,000 tons for last half delivery at $15 a ton. Pipe foundries have also picked up a considerable tonnage of southern iron at a price said to have been nearer $11.50 than $12 Birmingham. Two 20,000-ton sales of car wheel irons are also reported. There is a fair run of inquiries, and when consumers secure business justifying orders, they show no hesitation about paying present prices. Some producers are looking for something of a boom in the last half of August, while others expect no very marked change until after the election. Prices show no important change, as follows:

No. 1X foundry	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
Standard gray forge	15.25 to 15.50
Basic	15.00 to 15.25
Low phosphorus	21.00 to 21.50
No. 2 Birmingham	15.75 to 16.25
No. 2 Virginia	16.75 to 17.00

Finished Material.—Nothing of importance has occurred during the past week to change the situation, which continues quiet. Slowly the mills are increasing their capacity, but they are hardly yet as a rule up to 60 per cent. Plates seem most in demand, as the railroads still hold off from placing any orders of consequence for structural material. Prices follow:

Structural material, 1.75c to 1.90c, according to specifications; steel plates, 1.75c to 1.80c; refined iron, 1.30c to 1.35c; steel bars, 1.50c to 1.55c.

Old Material.—There is a much better feeling, based on freer buying and more numerous inquiries, and prices have been marked up in a number of lines. A steady improvement is now looked for. Prices, which show many changes, may be quoted as follows:

Old steel rails	15.00 to 15.50
No. 1 steel scrap	14.00 to 14.50
Old steel axles	18.50 to 19.00
Old iron axles	21.00 to 21.50
Old iron rails	18.25 to 18.75
Old car wheels	14.50 to 15.00
Choice scrap R. R. No. 1 wrought	16.25 to 16.75
No. 1 yard scrap	14.50 to 15.00
Machinery scrap	14.50 to 15.00
Low phosphorus scrap	18.50 to 19.00
Wrought iron pipe	12.50 to 13.00
No. 1 forge fire scrap	12.00 to 12.50
No. 2 forge fire scrap, ordinary	9.00 to 10.00
Wrought turnings	10.50 to 11.00
Axle turnings, heavy	11.00 to 11.50
Cast borings	9.25 to 9.75
Stove plates	11.00 to 11.50

The statement is made that when the Mary stack of the Ohio Iron & Steel Co., Lowellville, O., is lighted it will go on foundry iron. Previous to blowing out for relining the stack was making Bessemer iron.

NEW YORK.

Some Improvement in Structural Material—Pig Iron Quiet.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., July 21.

Pig Iron.—The pig iron market in this district continues quiet, although there is evidence of an increasing volume of activity as compared with that of the last few weeks. Inquiries are certainly more numerous, but no large tonnages are included. Here and there foundries are closing down for the remainder of the hot season, hence the aggregate melt is not increasing to any perceptible extent, but there is a general disposition to anticipate the business betterment expected in the early fall and several important consumers are understood to be ready to close for their requirements at an early date. Car wheel makers have recently taken three lots of 1,000 tons of charcoal iron, the most important tonnages in this line closed in several months, and several moderate sales of basic are reported at about the old price level. We quote, New York delivery, third quarter, as follows:

Northern foundry No. 1	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 2 southern foundry	16.00 to 16.50
Malleable	17.50 to 18.00
Basic	15.00 to 15.50
Gray forge	15.25 to 15.75

Ferro-Alloys.—A fair amount of business is current in alloys, particularly ferro-manganese and spiegeleisen, but ferro-silicon is relatively slack. A 200-ton sale of silico-spiegel is reported, the market level being $35, Pittsburg. Other quotations are: Ferro-manganese, $44 at seaboard; ferro-silicon, $71, Pittsburg; spiegeleisen, $30 to $31.

Finished Materials.—Structural lettings showed a slight increase during the past wek. The restoration of the burned Parker building, involving 1,200 tons of steel, will be done by the Calumet Construction Co. The Union Theological Seminary on Park avenue, 1,000 tons, has been taken by the Irving Iron Works Co. and the Domestic Economy building at Columbia University, 600 tons, by the Edward Corning Co. The American Bridge Co. has taken contracts for about 2,300 tons of bridge work for the Northwestern, with a small lot still pending, and the Wisconsin Bridge Co. has taken 700 tons for the St. Paul system. The Nelson-Story building at Los Angeles, Cal., 2,300 tons, has been let to the Llewellyn Iron Works. The Brown-Ketcham Iron Works are understood to be low bidders on fabricated material for the Educational Building at Albany, 10,000 tons. Hedden Construction Co. interests will fabricate the steel for the Prudential extensions in Newark, which will not be undertaken until next year. Bids are being received for a 1,200-ton viaduct for the Lake Erie Traction Co. at Westfield, N. Y., and contractors are estimating on a $5,000,000 apartment house, 12 stories, at Broadway and Eighty-sixth street, for the Belnord Realty Co. The post-office at the Pennsylvania up-town station, the municipal office building, the Mills 1,000-foot tower, the Equitable building and many other building projects are no nearer the active stage. Export business is reported active. The receivers of Milliken Bros., Inc., have taken contracts for 300 tons of structural and sheet metal work on an abattoir at Havana.

An eastern manufacturing interest has purchased 3,500 tons of Bessemer billets. An order for 11,000 tons of standard rails for the Mexican Central Railroad has been received by the Maryland Steel Co.

R. D. Wood & Co. have secured the order for 3,000 tons of cast iron pipe, mostly 24-inch, but ranging down to 6-inch, for Albany, N. Y., at a delivered price of $21.80 with $50.00 extras. Other bids were: U. S. Cast Iron Pipe & Fdy. Co., $22.45, with $50.00 extras; Chas Millar & Sons, $22.60, with $50.00 extras; and Warren Pipe & Fdy. Co., $22.75, with $46.00 extras.

A larger number of inquiries are current in plates, the demand being chiefly for universals, though an eastern independent interest has taken the order for 15 locomotives to be built by the Erie system. The Brooklyn water works proposition, involving either 21,000 tons of riveted pipe or 17,000 tons of lock-bar pipe, is up again through the action of the Long Island railroad in granting right-of-way privileges. Standard prices are being well maintained, though there is occasional shading on very narrow sizes by western Pennsylvania interests. In other lines there is little change and we quote: Angles, 3 to 6 inches x ¼-inch and heavier, 1.76c; beams, 3 to 15 inches, 1.76c; tees, 3 x ¼-inch and heavier, 1.81c; plates, carloads, tanks, 1.76c; marine boilers, 2.16c; bar iron, 1.41c; soft steel bars, 1.56c; sheets, No. 28, black, 2.66c.

Old Materials.—The inquiry current is broadening and it appears that consumers are becoming ready to purchase for early requirements in anticipation of better business in the early fall. Only relatively small tonnages are being considered, however, and mills are not inclined to meet the advances demanded by producers and dealers in certain lines. Old axles and heavy melting scrap are higher. We quote, gross tons, New York delivery, as follows:

Old iron rails	$14.00 to 14.50
Old steel rails, re-rolling	14.00 to 14.50
Relaying rails	20.00 to 21.00
Old car wheels	12.00 to 12.50
Old iron car axles	17.50 to 18.00
Old steel car axles	16.00 to 16.50
Heavy melting steel	12.00 to 12.50
No. 1 railroad wrought	13.50 to 14.00
Iron track scrap	12.00 to 12.50
Wrought pipe	10.00 to 10.50
Cast borings	6.00 to 6.50
Wrought turnings	7.50 to 8.00
Heavy cast scrap	12.50 to 13.00
Railroad malleable	9.00 to 9.50
Stove plate	9.50 to 10.00
Grate bars	9.50 to 10.00

BIRMINGHAM, ALA.

Coal Miners' Strike Delays Blowing In of Blast Furnaces.

July 20.

The pig iron make in the southern territory has been improved some by the blowing in of another furnace at Woodward, Woodward Iron Co. The furnace in blast at Florence, Sloss-Sheffield Steel & Iron Co., lost some time the past week because of an accident, but the ironmaker is again in operation. The Woodward Iron Co. is to blow out one of the furnaces at Woodward for repairs shortly. The strike among the union coal miners is delaying the proposed increase in iron making in this district, two furnaces being ready now for the torch and two others nearing completion. There will be no effort made to improve the production until conditions in the mining circles have settled down. The military are on guard in the mining field and a large number of strike-breakers are now being put to work.

The United States Cast Iron Pipe & Foundry Co., at Anniston, Ala., will require considerable iron. This company has made some good-sized purchases of the product, covering, most likely, all probable needs for iron.

While T. W. Guthrie, president of the Republic Iron & Steel Co., who is in the Birmingham district at present, says that the agreement arrived at with the Amalgamated Association of Iron, Steel and Tin Workers will concern only the northern mills of his company, there is hope that this signing of a contract may bring about the near operation of the rolling mills of the Republic company at Birmingham and Gate City, Ala. These mills usually give employment to about 2,500 men. They have been idle for some months.

The Algoma Steel Co. closed down its Sault Ste. Marie plant July 18 because of lack of orders.

The number of idle cars according to the July 8 bulletin was decreased 9,738 compared with June 28 bulletin.

BRITISH IRON MARKET.

Pig Iron Conditions Unsatisfactory and Lower Prices Expected.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., July 11.

The pig iron trade continues extremely unsatisfactory and the general impression is that still lower prices must come. The quarterly meeting in Birmingham on Thursday furnished a fair test and the inference was unmistakable. Pig iron from Northampton has ranged from 44s ($10.76) to 46s ($11.26) for gray forge. Buyers generally decline to look at these prices, some of them offering 42s 6d ($10.40). There is hardly any business done except for the most urgent requirements. In the Cleveland district it is singular that workmen are just receiving an advance of 1 per cent as the result of the sliding scale ascertainment, which shows an increase in the June quarter of 10d per ton. The comparative firmness of pig iron is somewhat surprising. For example, this week's price is the same as a week ago, sellers quoting 51s 3d ($12.54), with 49s 10½d ($12.21) three months. The average price a year ago was 57s 3d ($14.00). Although exports are declining, the amount in stock yesterday was 49,706 tons. The hematite trade shows no improvement, East coast mixed numbers selling at 56s 6d ($13.82).

METAL MARKET

CHICAGO.

July 21.

The week was characterized by marked dullness with respect to the metals. Copper and tin displayed practically no activity at all and sales were extremely few. Lead prices advanced slightly. We quote for small lots as follows:

Lake copper, 13½ to 14c; casting, 13¼c to 13½c; pig tin, 31½c to 32c; spelter, 4.85c to 5.00c; pig lead, desilverized, 4.50c to 4.65c in 50-ton lots; corroding, 4.65c to 4.75c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c list, f. o. b. LaSalle, in car lots of 600-pound casks; Cookson's antimony, 11c to 11½c; other grades, 10c to 10½c.

Trading in old metals has been too light to establish any changes in prices and we continue to quote to dealers as follows:

Copper wire, 11c; heavy copper, 11c; light copper, 10c; heavy red brass, 10c; heavy yellow brass, 8¼c; light brass, 5½c; No. 1 red brass borings, 8c; No. 1 yellow brass borings, 7½c; brass clippings, 8c; tea lead, 3½c; lead scrap, 3¾c; zinc, 3c; tin pipe, 20c; tin foil, 16c; pewter, 3c; electrotype plates, free from wood, 14c; electrotype dross, 2¾c; stereotype plates, 4½c; stereotype dross, 3¼c; prime slab zinc, $55 per ton.

NEW YORK.

July 21.

Copper.—The situation continues to gain strength through the heavier purchases of manufacturers from day to day, reflecting the improvement in business conditions. Electrolytic for prompt shipment can still be had at 12¾c to 12⅞c, though a large selling agency is refusing orders for fourth quarter at less than 13c. Lake is selling currently at 12⅞c to 13c, and casting at 12⅜c to 12½c.

Pig Tin.—The spot market is somewhat erratic, though a considerable premium is being secured and current business is on the basis of 29¼c. Sales for future delivery are light, consumers as yet declining to commit themselves.

Pig Lead.—Moderate pressure to sell in the face of a light demand has resulted in a slight easing up of prices, and the present quotation is now 4.40c to 4.45c, New York.

Spelter.—The situation is featureless and relatively weak, with occasional sales at the unchanged level of 4.45c to 4.50c, New York.

Antimony.—We quote: Cookson's, 8⅝c to 8¾c; Hallett's, 8¼c to 8½c; ordinary brands, 8c to 8¼c.

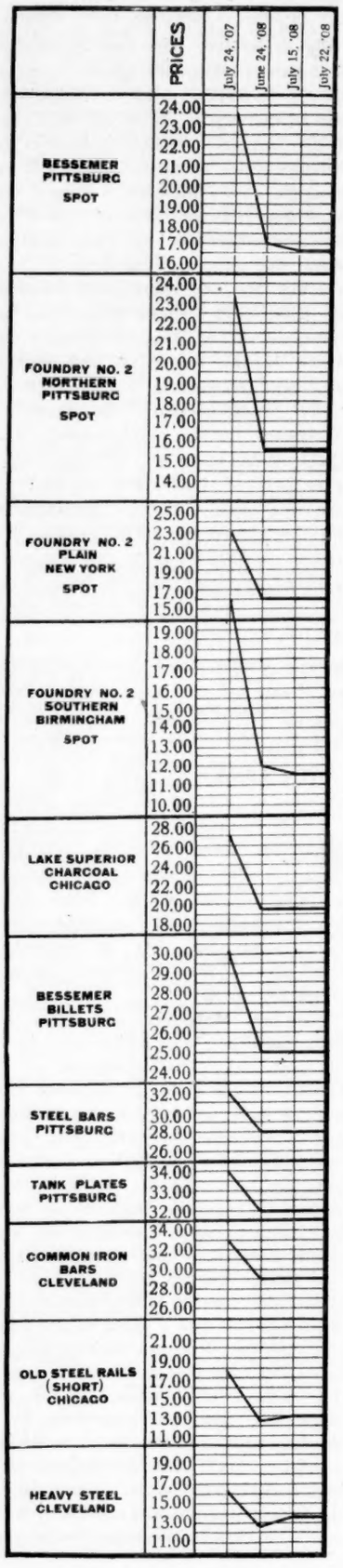
ST. LOUIS.

July 20.

Lead and Zinc.—There was a decrease of 50 cents a ton from the previous week in the base price of zinc in the Joplin district last week, ore selling as high as $38 a ton on a base price of $35, ranging down to $30 for lower grades. Lead sold as high as $60 a ton, with medium grades quoted at $58 to $59, on a weakening market.

The conditions for output are less favorable because of the decline in prices, and mine owners who had intended to restart their mines are inclined to abandon the idea for the present, except where it has been necessary to follow lease requirements. When the price reached $36 a ton of 60 per cent zinc, quite a number of operators began preparations to resume work, but as the price dropped back 50 cents during each of the two past weeks, it created a depressing effect.

PRICE CHART.



MAKES BIG ADDITIONS.

George W. Jackson, Inc., Purchases Land to Carry Out Extensive Plans.

George W. Jackson, Inc., 169-179 W. Jackson boulevard, Chicago, has just purchased the property which adjoins its present plant on the north for the purpose of building an addition to its bridge and steel department. Previous to this purchase the plant covered about 109,000 square feet, but the addition will make the total occupied area 293,000 square feet. The additional property purchased has a width of 333 feet and a length of 575 feet and extends from Elston avenue and the Milwaukee branch of the C. & N. W. R. R. on the west to the Chicago river on the east. The purchase will give the company about 550 feet of dockage as well as good railroad facilities, the Northwestern railroad having a branch through the property while the company itself owns four switches off this line.

It is the announced intention of the company to utilize part of the purchased property for a building 575 feet long and 100 feet wide, extending the entire length of the property east and west. A portion of this building will be used for steel fabrication and the remainder will be used for storage purposes. The new machinery to be required for this building will be one 100-foot span electric crane.

The company also intends to construct a small cast iron foundry about 40 by 150 feet, and a steel foundry about 60 by 150 feet. Too, a drydock for building and repairing the company's own scows will be built. The drydock will be 50 feet wide and 250 feet long with capacity for taking care of boats or scows drawing 15 feet of water. This will be arranged with an overhead crane for handling material. The remainer of the property will be used for a storage yard for forms, timbers and material employed by the company in its tunnel and shaft construction.

The new equipment which the company will require in addition to the 100-foot span crane will be one 40-foot span electric crane of 12½ tons capacity; one motor-driven angle shear mounted on a circular base, with a capacity of 6 x 6 x 1 inch angles; one plate planer; one large bending rolls for bending plate ¾ inches thick and 18 feet wide; one 48-inch rotary planer mounted on circular base, motor-driven; one 7½-ton locomotive crane and also large ovens for heating plates. In addition to this there will be the equipment for the cast iron and steel foundries.

The company at the present time has several large steel contracts on hand and it is the intention to increase the output of the plant to 15,000 tons a year, also to carry in stock a large amount of structural steel, plates, bars, etc., so that it will always be ready to make quick deliveries of either plates, structural steel or fabricated structural steel of every description.

Installing McClure Stoves.—G. W. McClure, Son & Co., Bessemer Bldg., Pittsburg, have taken the contract from the Bethlehem Steel Co., to erect five McClure stoves 22 feet in diameter and 100 feet high at the latter's works at South Bethlehem, Pa. With the completion of these stoves, the Bethlehem plant will have in operation 12 stoves of the McClure type. The McClure company is now actively pushing work upon its contract for the Indiana Steel Co. at Gary, Ind. Twelve stoves out of a total of 32 called for in the contract, have already been lined. These stoves are 22x 100 feet in dimensions. The same company has just started the brick work upon the seven new stoves, 21x100 feet, which it is erecting for the Tennessee Coal, Iron & Railway Co. at Ensley, Ala. When completed, these will make a battery of 20 McClure stoves at the Ensley plant. Some recent blast furnace contracts of the McClure company include the relining of the Martins Ferry stack of the Wheeling Steel & Iron Co., which has just been completed, and the remodeling and relining of the Belmont furnace of the same company now under way.

Further Scale Signatures.—Signed agreements on the iron, sheet and tin scales received the past week at the headquarters of the Amalgamated Association of Iron, Steel & Tin Workers, Pittsburg, included those with the following companies: American Rolling Mill Co., Middletown, O.; Lockhart Iron & Steel Co., McKees Rocks, Pa.; Zug & Co., Pittsburg; Pittsburg Forge & Iron Co., Pittsburg; Kansas City Bolt & Nut Co., Kansas City, Mo.; Ft. Worth Iron & Steel Co., Ft. Worth, Tex.; and Wheeling Steel & Iron Co., Top Mill, Wheeling, W. Va. The Youngstown Sheet & Tube Co. has also signed the iron and sheet scales and resumed operations this week.

Resumption of double tracking north of Mercer Junction, Pa., has been begun by the Pittsburg, Bessemer & Lake Erie railroad, steel ties being used. It is expected by fall that the company will have a double track to Conneaut Harbor, O.

NEW PAGE OPEN-HEARTH FURNACE IN OPERATION.

The Page Woven Wire Fence Co., Monessen, Pa., has completed and is now successfully operating a new 50-ton basic open-hearth furnace. Several heats have already been made, and these have proven entirely satisfactory. By the completion of this furnace, the company has increased its steel production to 50,000 tons annually which is about the capacity of its rod mill, and this tonnage will be ample for all its needs. Accordingly the company will not be a purchaser of steel in the open market in the future, which will be of material benefit to itself because of the difficulty in the past to obtain the high grade of steel demanded for the exacting uses of its specialized work, such as high grade wire fencing, wire springs, etc.

Will Test the Law.—An interesting and important question relating to the right of the state to obtain certain information from manufacturing concerns will soon be decided in the courts of Cuyahoga County, Ohio. A few days ago, on complaint of an agent of the Bureau of Labor Statistics of Ohio, J. H. Webster, president of the Variety Iron & Steel Works Co., of Cleveland, was arrested for refusing to answer questions in the blank form sent out by the Bureau. These questions inquired as to the capital invested by the Variety company, value of goods manufactured, amound paid for rent, taxes and insurance, days in operation, wages paid employes, salaries paid salesman, bookkeepers, clerks and stenographers, and inquired into other matters relating to the business of the company. Mr. Webster holds that these inquiries are inquisitorial and that the police power of the state does not authorize the enactment of the law under which it is being prosecuted. The law provides for a fine of from $50 to $500 for failure to answer the questions propounded. The case will be heard before a justice of the peace.

Large Power Plant for Spokane.—The Washington Water Power Co., Spokane, Wash., has commenced the construction of one of the largest hydro-electric stations west of the Rocky mountains. The new plant is located at Little Falls on the Spokane river, and will have a capacity of 20,000 kilowatts. It will be completed in 1910. The power will be used for railway and industrial purposes in and around Spokane.

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July 23, 1908.

ENGINEERING EDUCATION AND THE ENGINEER'S DEGREE.

In the report of the convention of the Society for the Promotion of Engineering Education, published in THE IRON TRADE REVIEW of July 11, a brief reference was made to a joint committee on education. This committee deserves considerable attention from manufacturers and all others who are interested in engineering education from any standpoint. The appointment of this committee is by far the most important step that has been taken in many years. It is composed of men of the highest standing in the engineering profession, as a reference to the list as published in these columns will show. It consists of two members each from the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, the American Chemical Society, together with three members from the Society for the Promotion of Engineering Education.

The committee is expected to investigate the present status of engineering education in all its branches. It will inquire into the value of culture studies, such as languages, in engineering courses. It will decide as to what is the most practical length of courses, and will investigate the value of co-operative courses, such as have been instituted at the University of Cincinnati. The committee will do more than this. It will study the relation of the young graduate to his employer, and will also study the faults of the average graduate of an engineering school, and will recommend such changes in the courses as will remedy these defects.

The proposed method of work which the committee will follow will be the holding of a series of conferences with eminent educators, and a series of similar conferences with eminent manufacturers and engineers. It will then tabulate and correlate the ideas obtained on all the subjects.

No subject in the field of engineering discussion has ever before been considered of sufficient importance to receive the joint attention of the five great engineering societies of the country. The fact that these societies have combined on this question insures that the work will be well done. In the above list of subjects which are set forth, there might be added one or two others for the committee to consider. During the discussion at Detroit, it was brought out that there are over 100 degrees given in the various engineering schools in the country. Many of these overlap; many different degrees have the same meaning; and different colleges give different degrees for the same course of study. This is a question which should, undoubtedly, receive attention from the hands of the committee. The granting of an engineering or scientific degree should mean something. If a man upon graduating from college is entitled to the degree "bachelor of science," the public should know exactly what that degree means. If he is entitled to the degree "mechanical engineer" or "electrical engineer," it should mean that he has taken a more severe course; that he possibly has done post-graduate work, and is, therefore, better fitted to solve the problems which arise in engineering. It is unquestioned that the number of degrees, as given now, is too great, and that comparatively few persons can tell what the degree stands for after it is given. The committee would do a great service if it should lay down the courses leading to the various degrees. It would do as great a service if it would specify just which colleges are entitled to give these degrees. The value of the education received in an institution depends upon many more things than the course as printed in the catalog. It depends upon the faculty, on the equipment, and on the method of instruction. It is eminently unfair today, to say that a man holding a degree, say of mechanical engineer, from one institution, is as well prepared for his profession as the man holding the same degree from another college.

It may be impractical, but it would be a step in the right direction if the committee was empowered to investigate the colleges themselves, and state which were fitted by their faculty, equipment, course of instruction and other necessary considerations, to give say the degree of bachelor of science, and which the engineer's degree. A record of this character would form sort of a roll of honor for the colleges of the country, and the effort by the various colleges to keep upon this roll would have a distinctly beneficial influence on engineering education.

SOME FRESH IRON AND STEEL STATISTICS.

The annual statistical report of the American Iron and Steel Association which has just been issued gives some statistics not hitherto made public. The production of rolled iron is given at 2,200,086 gross tons, showing a slight increase over 1906.

Between 1890 and 1904 separate statistics were not gathered of the production of rolled iron, the total of rolled iron and steel being given.

During that hiatus, the production of rolled iron probably dropped to less than a million tons. Prior to 1888, separate statistics of rolled steel were not gathered, as in the earlier years the bulk of the production was rolled iron. The only statistics of rolled material which separate iron and steel are those given below:

Production of Rolled Material, Gross Tons.

	Iron.	Steel.
1888	2,153,263	2,464,086
1889	2,309,272	2,929,656
1890	2,518,194	3,504,681
1904	1,760,084	10,253,297
1905	2,059,990	14,780,025
1906	2,186,557	17,401,911
1907	2,200,086	17,664,736

The production of tin and terne plate is reported for 1907 at 514,775 gross tons, a decrease of 62,787 tons from 1906, which holds the record. This decrease was due partly to somewhat poorer crops in 1907, but chiefly to the financial uncertainty towards the close of the year. Tin plate is in a class by itself as regards consumption, since it is absolutely consumed when used, whereas practically all other iron and steel commodities are merely put into use, and live a longer or shorter life of actual employment. It is well recognized that financial conditions have little to do with the actual consumption of tin plate, but it is the normal tendency of the industry to make up stocks late in the year against the heavy spring demand. These stocks may exist, at the end of the year, as tin plate carried by the mills, as tin plate carried by consumers, or as manufactured cans. This carrying of stock was prevented by the financial troubles late in 1907, so that there were not normal stocks late in the year. The demand was deferred, and the activity of the mills in the past few weeks, when in normal years they would be closing, has gone far to make up the deficiency.

While the production of crucible steel has not been increasing rapidly, the year 1907 established a new record, passing the previous record, made in 1906, by between 3 and 4 per cent. The production of crucible steel ingots and castings in 1907 was 131,234 gross tons, against 127,513 gross tons in 1906. Crucible steel making has had its ups and downs. As far back as 1881, 80,000 gross tons were made, that being easily the record at that time, as it was more than double the production in any year previous to 1879. In 1894 production dropped to 51,702 tons, since when there has been a fairly steady increase.

A Correction.—Owing to transposition of two lines, the last paragraph of the article on "Concrete Dock for the Upson Nut Co.'s Cleveland Furnace" on page 165 of this issue is incorrect. This paragraph should read: "The south dock and north dock are similar in construction. This work is now under construction, and it is expected that the dock will be completed early in September."

PRACTICAL STEPS OF SEVERAL INSTITUTIONS OF LEARNING.

Editor The Iron Trade Review:

I have read with interest your excellent editorial on "A Demand for the Practical in College Training."

Apparently many of gentlemen to whom you refer do not know how much of the practical there is in many of the colleges of this country. If they did and would endeavor to hold up the hands of those who are trying to graduate men, who shall not only know what is to be done, but how to do it, the good work would rapidly advance.

May I speak for schools for whose work I have been personally responsible?

A combination of the practical with the theoretical was introduced by myself as president (1887-1899) in the Michigan College of Mines, so that the college became widely known for its practical system of education. It took high rank and attracted students from all over the world. The course is still followed at that college, which maintains its high rank amongst the leading schools of mines.

In 1902 I introduced into the School of Mines and Metallurgy of the Pennsylvania State College, six or more weeks of practical work in the summer vacation as a substitute for the usual two weeks of summer school. In 1897 it was arranged to allow students to replace an equivalent amount of their elective work by ten weeks of practical work during the summer vacation.

In the School of Mines of the Western University of Pennsylvania, I have arranged to have substituted for an equivalent amount of elective work from four to twelve weeks of practical work during each summer vacation. This will enable a man, if he has the health and strength to do so, to graduate in three years instead of taking four years.

I have sent you marked catalogs showing the published statements about the practical work. It is only a beginning, but one-fourth of the time spent in practical work is a great advance over the old system of pure theory.

I have simply given the way in which the question of practical education has been met in these special cases. There are hundreds of colleges in this land meeting this question, each in its own way as adapted to its local conditions.

Further in the three institutions above mentioned, practical work is recognized by allowing men of age and experience who desire to understand the principles belonging to their business to enter the schools without restriction and take such work as they are prepared for.

M. E. Wadsworth.

Dean of the School of Mines and Metallurgy of the Pennsylvania State College, and Dean of the School of Mines of the Western University of Pennsylvania.

State College, Pa., July 3, 1908.

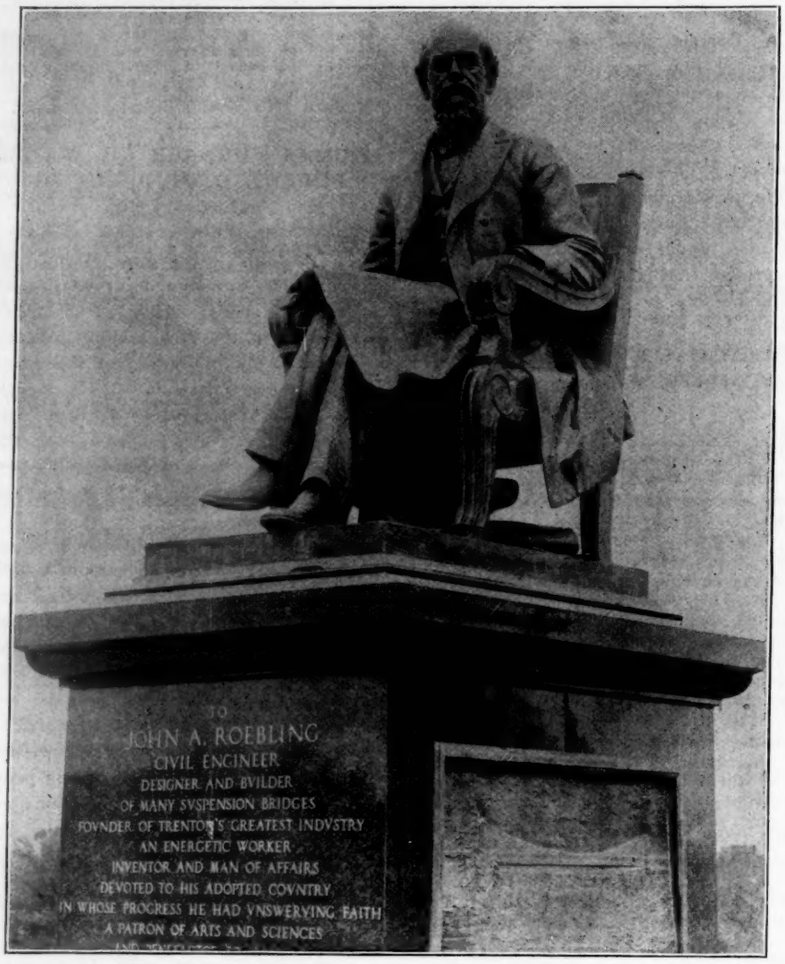
THOMAS FURNACE CO. MAKES PURCHASE OF LAND IN MILWAUKEE.

The Thomas Furnace Co., Milwaukee, through President John M. Thomas, has announced the closing of a deal for the purchase of 37 acres of land near the Kinnickinnic avenue plant of the company. At the same time the statement is made that operating will be resumed at the blast furnace plant at the beginning of the month. The additional land just bought will first be utilized for the storage of pig iron. One of the features of the improvements to be made on the newly acquired property will be the installation of a magnetic crane for transferring pig metal. A magnet, manufactured by the Cutler-Hammer Co., Milwaukee, and having a lifting power of more than 1,000 pounds, will do the work formerly done by derricks. The new stack is nearing completion and will be ready when operating is resumed next month. Thousands of dollars have been expended in improvements at the Thomas plant in the past few years and in the past seven years the plant has tripled its output.

The councils of the British Society of Engineers and the Civil and Mechanical Engineers' Society have approved of a plan for the amalgamation of the two bodies. This step will result in welding the two foremost British technical societies into one far-reaching organization. It is further proposed to extend the operations of the society beyond merely reading and discussing papers by providing facilities for the free supply of legal advice to members in connection with their professional work. A contract, terminating at the close of 1909, has already been made with the societies' solicitors, for the purpose of trying out this innovation.

STATUE OF JOHN A. ROEBLING UNVEILED

The memory of John A. Roebling, builder of the Brooklyn bridge and founder of the wire and wire rope and cable making works carried on by the John A. Roebling Sons & Co., at Trenton, N. J., was honored in his former home city of Trenton June 30, when a splendid statue of the engineering genius was dedicated in Cadwallader Park with appropriate ceremonies. Probably 10,000 citizens of Trenton joined in the dedication ceremonies which included a parade of 6,500 employes of the Roebling company.


TO
JOHN A. ROEBLING
CIVIL ENGINEER
DESIGNER AND BVILDER
OF MANY SVSPENSION BRIDGES
FOVNDER OF TRENTON'S GREATEST INDVSTRY
AN ENERGETIC WORKER
INVENTOR AND MAN OF AFFAIRS
DEVOTED TO HIS ADOPTED COVNTRY
IN WHOSE PROGRESS HE HAD VNSWERVING FAITH
A PATRON OF ARTS AND SCIENCES

The orator of the day was Henry D. Estabrook, general counsel of the Western Union Telegraph Co. who was introduced by former Governor Edward Stokes. Miss Emily M. Roebling, grand-daughter of John A. Roebling, unveiled the monument. Among those at the dedication were: United States Senators Frank O. Briggs and John Kean, Colonel Robert C. Clowry, the Misses Roebling, Governor Fort, Representative Ira Wood, William Couper of New York, sculptor of the statue, and many socially prominent in New Jersey, New York and Pennsylvania.

The monument is 15 feet 7 inches high exclusive of the concrete base underlying. The pedestal is of Banacord red Swedish granite and is nine feet high. The statue proper is 6 feet, 7 inches high and is modeled in a sitting posture otherwise it would have reached a height of 8 feet. On the right side of the granite pedestal is a bronze panel containing a reproduction in relief of the first railroad suspension bridge built over Niagara Falls and on the left side is another panel containing a replica, also in relief, of the Brooklyn bridge. The greater part of the cost of the monument was defrayed by popular subscription.

WAGE SCALE SIGNED

By Republic Iron and Steel Co.—Bimonthly Settlement Made.

The Republic Iron & Steel Co. and the Amalgamated Association of Iron, Steel & Tin Workers have reached an agreement upon the 1908-09 iron mill wage scale, the adjustment being practically identical in all particulars with that entered into between the Western Bar Iron Association and the workmen at the Detroit conference. The meeting of the representatives of the Republic company and the Amalgamated association at which a decision was reached, was held at Pittsburg, July 17. This was the second time the employers and men had conferred, the deliberations at Pittsburg several weeks ago, having resulted in a deadlock.

The boiling, busheling, puddling, piling and finishing scales signed by the Western Bar Iron Association are accepted by the Republic company. The only change in the latter's agreement is a minor one relative to a foot-note under the bar and 12-in. mill schedule which is applicable to but one or two mills. This is an addition to Clause 7, providing that when working frog fillings, on straight two-high bar mills, six per cent less than iron prices shall be paid.

The effect of the settlement upon the mill operations of the Republic company has been of no great importance as yet. The Brown-Bonnell steel plant at Youngstown resumed Monday, but the nine iron mills are still idle and will be started gradually as trade conditions improve.

The first bi-monthly settlement under the new scales was made at Pittsburg Saturday, July 18, when an examination of the sales sheets of the Republic and the western companies, showed the boiling rate for July and August would be $5.37½ per gross ton, being based upon a $1.35 bar iron card. This is a reduction of $.75 per ton over the rate applying during May and June when the adjustment was $6.12½ a ton upon a $1.45 price of bar iron. The settlement for sheet and tin workers was made upon base prices, the same as two months ago, but as the new sliding scales adopted by the American Sheet & Tin Plate Co. and the Amalgamated, provide a horizontal reduction of practically two per cent in sheets and six per cent in tin plate for all operatives except the tin heaters, the men will receive less wages by this much during July and August.

P. J. Brown, blast furnace and rolling mill mason work contractor, has removed from 414 New England building to 1210 in the same building.

TARIFF TALK DEPLORED

By Manager Swank—Report of the American Iron & Steel Association.

The annual report of the American Iron & Steel Association for 1907 has just been issued. In his comments on the iron trade in 1907 and the first half of 1908, General Manager Swank refers to the financial panic of October, 1907, which was soon followed by a cessation in activity in all the leading industries except agriculture. He says that so violent, instant and widespread a reaction in the iron trade is entirely without precedent. Naturally, with the greatly decreased demand for iron and steel and the raw materials which enter into their production, the business of the railroads at once declined. Mr. Swank says that while in May and June there was an increased demand for most products, the favorable conditions which prevailed during the greater part of 1907 and the whole of 1906 have not been re-established. "Whether or not the remainder of this year," says Mr. Swank, "will witness the improvement or further reaction in the general trade conditions which now prevail, including the iron trade, no man can now with safety predict." He deplores the proposed revision of the tariff, and declares that except for the tariff threats and political uncertainties of the present year, the country ought to emerge from the existing depression in a very short time.

While the interruption to the prosperity of the iron trade started in 1907, it occurred so late in the year that the statistical record for the whole twelve months shows few important decreases in production as compared with the exceedingly exceptionally prosperous year of 1906. The general statistical summary is as follows:

Gross tons, except for coke and nails.	1906.	1907.
Shipments of iron ore from Lake Superior	38,523,439	42,245,070
Production of iron ore	47,749,728	51,720,619
Shipments of Pennsylvania anthracite coal	55,698,595	67,109,393
Production of all kinds of coal	369,783,284	428,973,251
Production of coke, in net tons	36,401,217	40,779,564
Shipments of Connellsville coke, in net tons	19,999,326	19,029,058
Shipments of Pocahontas Flat Top coke, net tons	2,056,006	2,314,938
Production of pig iron, including spiegel and ferro	25,307,191	25,781,361
Production of spiegeleisen and ferro-manganese	300,500	339,348
Production of Bessemer steel ingots and castings	12,275,830	11,667,549
Production of open-hearth steel ingots and castings	10,980,413	11,549,736
Production of all kinds steel ingots and castings	23,398,136	23,362,594
Production of structural shapes, not including plates	2,118,772	1,940,352
Production of plates and sheets, except nail plate	4,182,156	4,248,832
Production of iron and steel wire rods	1,871,614	2,017,583
Production of all rolled iron and steel, except rails	15,610,581	16,231,168
Production of Bessemer steel rails	3,791,459	3,380,025
Production of all kinds of rails	3,977,887	3,633,654
Production of all rolled iron and steel, including rails	19,588,468	19,864,822
Production of iron and steel cut nails in kegs	1,189,239	1,109,138
Production of iron and steel wire nails in kegs	11,486,647	11,731,044
Imports of iron ore	1,060,390	1,229,168
Exports of iron ore	265,240	278,608
Imports of iron and steel, foreign value	$ 34,827,132	$ 38,789,851
Exports of iron and steel, home value	$172,555,588	$197,066,781
Miles of new railroad built in the calendar year	5,643	5,499
Tonnage of iron and steel vessels built, calendar year	336,500	436,183

The whole number of furnaces in blast at the end of 1907 was only 167, a smaller number than at the close of any year since 1896, when only 159 furnaces were active. The relative production of the United States Steel Corporation and independent interests shows little change. In 1906 the Steel Corporation produced 44.5 per cent of all the pig iron made in the country, and in 1907 41.9 per cent of the total. Of the Bessemer and open hearth steel ingots and castings the Steel Corporation in 1906 produced 58.1 per cent, and in 1907 its percentage was 56.4. In finished rolled products, including rolled forging blooms and billets, the United States Steel Corporation produced 48.1 per cent in 1906 and 47.5 per cent in 1907.

Mr. Swank and his able assistants have this year devoted an unusually large amount of work to the collection of statistics concerning the world's iron trade. The comprehensive tables published in the report embody the only authentic statistics for the whole world for 1906. The world's production of pig iron and steel for that year was as follows:

	—Pig Iron—		—Steel—	
Countries—	Production, Tons.	Percentage.	Production, Tons.	Percentage.
United States	25,307,191	43.15	23,398,136	45.82
Great Britain	10,109,453	17.24	6,575,000	12.88
Germany and Luxem	12,292,819	20.96	11,307,807	22.15
France	3,314,162	5.65	2,478,058	4.85
Belgium	1,375,775	2.35	1,440,860	2.82
†Austria	1,267,890	2.16	1,500,000*	2.94
Hungary	419,691	0.71		
Russia and Finland	2,661,029	4.54	2,669,020	5.23
Sweden	604,789	1.03	398,047	0.78
Spain	379,241	0.65	258,455	0.51
Italy	135,296	0.23	390,740	0.76
Canada	541,957	0.92	570,889	1.12
Other countries (about)	240,707	0.41	72,988	0.14
Total	58,650,000	100.00	51,060,000	100.00

†Includes Bosnia and Herzegovina. *Estimated.

No 1 stack of the Columbus, O., blast furnace of the Columbus Iron & Steel Co., was lighted July 15. Repairs are being completed on another stack of the company.

IMPROVEMENTS OF THE SLIGO IRON & STEEL CO.

Extensive improvements are rapidly nearing completion at the plant of the Sligo Iron & Steel Co., Connellsville, Pa., and the company will soon be in a position to resume operations upon an enlarged scale when business conditions shall have sufficiently brightened.

The remodeling of the mills, which is under the supervision of J. S. Munson, involves the expenditure of a large sum. A trolley line, 1,000 feet in length has been installed for a circuit about and through the mills and a craneway 180 by 50 feet has been erected. Two new furnaces are now receiving their finishing touches. The entire pipe line throughout the plant has been changed and instead of the water being received by the ordinary method, it will be forced by compressed air to the point needed.

All the guide mills in the plant have been rearranged and a Belgian mill has been installed. The straightening floor has been rebuilt and refitted and instead of the 60-foot table, one of the 90 feet has been substituted and this will be sufficient to handle material of practically all market sizes. Among other improvements made by the company, are the addition of two 150-horsepower boilers to utilize the waste heat from the furnaces; the renewal of the shears along the latest lines of manufacture and the installation of an electric crane which will supplant the old method of loading and unloading material and transporting it about the shops. An electric magnet for quick handling of material will aid in this latter mill economy.

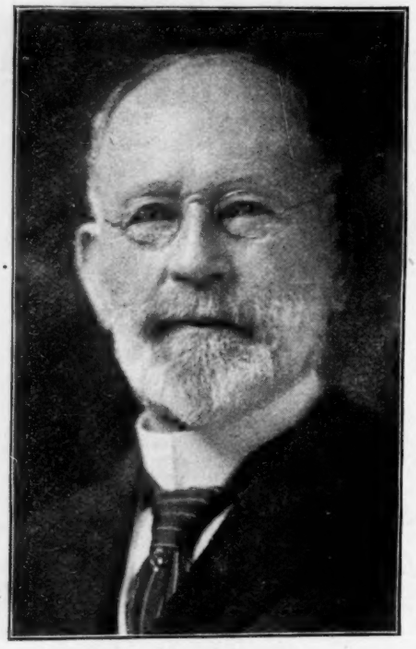
The products of the Sligo Iron & Steel Co. include iron and steel sheets, iron and steel plates, bar iron, and wrought steel floor plates.

The Packard Electric Co., Warren, O., has moved into its new 2-story and basement brick building 48x84 immediately east of its old quarters. The old frame building formerly occupied by the company will be occupied by a part of the Ohio Lamp factory.

EARLY TIN PLATE MAKER

Was William F. Niedringhaus, Who Died in St. Louis.

The funeral of William F. Niedringhaus, 73 years old, manufacturer, original tin plate man, churchman and philanthropist, was conducted Thursday from his residence, 5105 Lindell boulevard, St. Louis, where he died July 14 as noted in THE IRON TRADE REVIEW. The services were simple and were in charge of Rev. Fayette L. Thompson, pastor of the Lindell Avenue M. E. Church, assisted by Rev. David F. Wahl. In Granite City, Ill., where Mr. Niedringhaus had extensive interests, every business house and factory was closed in accordance



WM. F. NIEDRINGHAUS.

with resolutions passed at a mass meeting Tuesday night, at which Mayor Morgan LeMasters presided. Many of Mr. Niedringhaus' friends and employes went from Granite City to St. Louis in special cars to attend his funeral.

Mr. Niedringhaus was born in Westphalia, Germany, and removed to St. Louis in 1856. The next year, with his brother, Frederick G. Niedringhaus, he established a business which, in 1886, was incorporated as the St. Louis Stamping Co. Property for the plant was bought in 1864. The firm established rolling mills in St. Louis in 1878 because of trouble in getting material from England. These mills are still in operation. The firm later bought a large tract of land at Granite City, Ill., opposite St. Louis, and established one of the largest enameling plants in the world also a steel plant and additional rolling mills. The concern now is known as the National Enameling & Stamping Co.

Mr. Niedringhaus was a director in the company, also director general of the steel and iron department. He was one of the original tin plate men of the United States, and the first man to build a power press for drawing shapes out of sheet steel. This was installed in 1884, and still in operation, though modernized. He also was one of the first to make enameled ware. He had been a leader in the Methodist Episcopal church for many years, and had aided in the building of a number of religious edifices. While a member and trustee of the Lindell avenue M. E. church, St. Louis, his charities were not limited to that congregation. In 1888, in conjunction with his brother, Fred G. Niedringhaus, he built and had since maintained the Niedringhaus Memorial Mission at Cass avenue and Seventh street, St. Louis, in memory of his son, Walter Niedringhaus, who died in 1884.

He also built the Niedringhaus Memorial M. E. church at Granite City, Ill., in 1894. He was an uncle of Thomas K. Niedringhaus, of St. Louis, a Republican politician.

Samuel Russell, aged 60 years, proprietor of a pattern works on Carnegie avenue, Cleveland, died July 19. He was a resident of Cleveland for 40 years.

Louis Kenck died July 13 at Pleasant Prairie, Wis., aged 82 years. In 1857 he built the first locomotive run on the Northwestern railroad, and himself ran it on its first trip from Milwaukee.

Dennis S. Dockstader, formerly general foreman of the car department of the Erie railroad at Meadville, Pa., died there July 13, aged 78. He was master car builder for the Erie for 20 years, retiring as general foreman 12 years ago.

PERSONALS.

Joshua A. Hatfield, president of the American Bridge Co. of New York, sailed a week ago on the Kronprincessen Augusta Victoria for a two months' tour of Germany and Austria.

A. V. Coming has been appointed assistant to the general manager of the Ralston Car Co., Columbus, O.

John C. Sessor has resigned as vice president of the W. W. Kenly Co., rails and track appliances, Chicago, his resignation becoming effective July 14. For the present he has established offices at room 56, 209 Adams street, Chicago.

Marquis Gholson, of Cincinnati, has been named general superintendent of the Ward Fence Factory, Decatur, Ind.

Robt. Field has resigned his position with the Domhoff & Joyce Co., Cincinnati. His present address is 12 Martanna, Covington, Ky.

C. E. Everett, who has been auditor of the Algoma Steel Co. since its reorganization, has resigned. L. Hogarth has been appointed to succeed Mr. Everett.

John R. Morgan, formerly chief engineer of the Morgan Engineering Co., Alliance, O., has been appointed general manager of the Calumet Engineering Works, Harvey, Ill., effective July 15.

Alexander McInnes Sr., chairman of the McInnes Steel Co., Ltd., Corry, Pa., will sail July 25 for a trip to Europe, and will establish agencies in England and Amsterdam, Holland, for the sale of the company's new Cello steel.

John Van Brunt has been installed chief engineer of the American Stoker Co. following the reorganization of its management. The company's general offices are now established in the Park building, Pittsburg. Advantageous arrangements have been made with the Coshocton Iron Co., whereby prompt execution of orders for stokers and parts both chain grate and American underfeed can be made.

Blowing Engine Orders. — Worth Brothers Co., Coatesville, Pa., has placed an order with Allis-Chalmers Co. for three vertical blowing engines of the largest type ever constructed to furnish blast for the proposed new stack. The Sloss-Sheffield Steel & Iron Co. has contracted for another blowing engine of similar type for immediate delivery at Birmingham, Ala.

The American Steel Foundries officially announces that six of the nine plants of the company are operating, and that business is improved over the earlier months of the year. The new stock certificates will be ready for distribution about the middle of the month.

"Nov. 1 will see another shortage of freight cars, perhaps not so great as last fall, but serious enough to hamper shippers," said J. O. Klapp, manager of the Wisconsin Car Service Association.

THE VARIOUS PLANS FOR PAYMENT OF WAGES[1]

Discussion of the System of Diminishing and Increasing Premiums for the Purpose of Increasing the Efficiency of Employes—Analysis and Comparison

By Harrington Emerson.[2]

The first part of Prof. Forrest E. Cardullo's essay entitled "The Payment of Wages" which appeared in The Iron Trade Review of March 19 is an excellent and concise resume of many of the arguments against day wages and against payment by the piece. They show the author to be thoroughly familiar with this part of the subject. To correct the evils Prof. Cardullo endorses the Rowan premium plan of rewarding labor.

Purpose of Wage Systems.

The difficulties of smoothing the relations between employer and employe on the great subject of wages, the great necessity there is to reduce the wastes that come from inefficiency, make a method that will accomplish either of these results or both of them highly desirable, especially if it is better than any method which is already in existence and which has been succesfully tried on a large scale for the same purpose.

Any method recommended must therefore be better than day work, better than piece rates, better than the Halsey premium plan, better than Mr. Taylor's differential piece rates, better than Mr. Gantt's bonus plan, better than the efficiency plan developed by the writer and his assistants.

Requirements of Good Wage System.

Without reference to other methods which may or may not be better, any method of paying labor should, above everything else have for its first object the allaying of the irritation and suspicion of the workers, which for instance has made piece work so obnoxious. It should appeal to the workers as a fair, equitable and tempting plan. If it does not do this it will fail, add to the present difficulties and be pointed at for years to come as a warning example of the desire of the employer to get the better of the worker.

In addition the employer has two separate and distinct objects in view. 1. He may merely desire to secure the good will and co-operation of his employes. 2. He may find it imperative to reduce his costs. The employer therefore cannot be expected to welcome any plan which fails in both these respects, which will antagonize employes and which will not reduce costs, but increase them.

Prof. Cardullo's plan should therefore be most carefully analyzed both comparatively and absolutely. If it will appeal to the worker and at the same time benefit the employer, if it is better than any plan hitherto devised or used, it ought to be widely recommended and adopted; but if it will not bring about what is most needed, mutual good will and confidence, based on common interest, then this fact ought also to be known, so that its author can revise it. His knowledge of the whole subject will enable him to do this.

Taylor's Ideas.

Fred W. Taylor, more than any predecessor, realized the tremendous reduction in cost which followed greater efficiency on the part of the worker. He therefore evolved a plan by which in every possible manner the duty of increasing the efficiency of the worker devolved upon the employer, the worker becoming wholly subordinate to a perfected system of shop management. Knowing, however, that the co-operation and good will of the worker could be secured by higher pay, and knowing of no other method as simple and as efficacious in securing this co-operation, he found it economically expedient to pay a higher rate per piece if the worker did more, and called this incident to his system "The differential piece rate."

The essentials of Mr. Taylor's system were not the method of paying labor, but the putting of the responsibility for high efficiency on the shop managers, and as a basis for high efficiency, to determine with scientific accuracy the exact times required for each and every operation. The initial accuracy of the rates made it difficult for the worker ever to increase his earnings beyond the amount predetermined as proper. These two principles are fundamental and superior in their importance to any system of paying wages.

Mr. Gantt, a disciple of Mr. Taylor, using also the methods of exact scientific determination of standard times, evolved a system of paying labor which included Mr. Halsey's system of a guaranteed rate per hour and a definite bonus for a predetermined efficiency.

Cardullo's Diminishing Premium Plan.

Prof. Cardullo calls this plan "The Diminishing Premium Plan." He is in favor of a premuim because if the worker can be encouraged to do the same work in less time, there is a great gain to the employer through the reduction of overhead charges and the profit arising from an increased output. The employer can therefore well afford to pay a higher rate per hour to the worker. This was the theory back of piece rates since the worker is paid in exact proportion to what he produces. It developed however that whenever the earnings of the worker became large, whether this was due to his own special skill or to any other cause, the employer arbitrarily made a cut, "trimmed the rate," and this naturally aroused intense antagonism on the part of the worker, who saw in the method merely a kind of trick, to stimulate him to the uttermost, then to pay him no more than he had formerly received for much easier work.

Halsey's Premium System.

To avoid the constant and embittered feeling engendered by the practice of trimming rates, Mr. Halsey devised the premium system under which an initial time is set and the saving below this time divided between worker and employer, the theory being that this would obviate the necessity for any correction in the rate.

Mr. Halsey's premium plan is one of the most excellent ever devised and could with a few modifications be used in its entirety. Its defects are not fundamental but merely that it has not had the courage of its own convictions. The initial times are

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[1]This article is a discussion of Forrest E. Cardullo's "The Payment of Wages," which appeared in The Iron Trade Review of March 19, 1908. Mr. Cardullo will reply to this in an early issue.

[2]Efficiency and Standard Practice Engineer, New York City.

not set with sufficient accuracy, the preponderating responsibility of the managers, not of the workers, for improvement is not recognized, and because of fear that initial times are not accurate, the niggardly treatment of the worker, the failure to make any provision for revision, the payment by the piece instead of using the basis of average time, expose the Halsey premium plan in operation to many serious practical troubles.

Emerson's "Santa Fe" System.

For several years the writer had been using Mr. Taylor's cardinal principles of: 1. Responsiblity of managers for best conditions. 2. Careful scientific determination of standing time allowances. 3. High rates of pay for high efficiencies.

In 1904, in the emergency of a great and bitter labor struggle he was called on to evolve a wage system applicable to about 12,000 men working under diverse conditions at many different kinds of work, much of it repair work with such cases as exploded or wrecked engines. The system evolved known as the "Santa Fe" system, was the outgrowth of several years' contact with the severest possible conditions, it is therefore not an academic system but one that has been perfected in the shop rather than in the office.

Day rates were out of the question as they had proved far too expensive. Piece rates were also out of the question as the workers positively refused to agree to them. From the start Mr. Taylor's principles were accepted, but owing to the prejudice against the word, "piece rate," his system of paying wages, "differential piece rates," could also not be introduced. Owing to the impossibility of persuading the men, who had been taking from 6 to 8 hours to do a given job, that it could be done reasonably in 4 hours, it was not possible to use Mr. Gantt's system, as the men would have refused to try for a 4-hour limit.

Therefore it was found necessary to adopt a modification of Mr. Halsey's premium plan, namely to guarantee regular hour rate but to give a much larger initial time than could be ultimately attained, and to pay a very small premium for a small gain in time, a larger premium for a greater gain and finally a standard premium (generally 20 per cent on wages) for standard time.

Both Mr. Taylor and Mr. Gantt desired that a worker should do neither more nor less than the standard. Assuming that an absolutely accurate time could be determined for each job in a manufacturing plant in the east and that its workers might be of fairly uniform ability the writer found in the western wilds that on repair jobs, however accurately an average time might be determined, single jobs would vary very greatly above or below the average, and also that the mixed workers, Americans, foreigners, Mexicans, Indians, Japanese, etc., varied enormously in average efficiency, so that on the same work, the best man would turn out 20 times as much as the poorest man, the best showing 200 per cent efficiency and the poorest as low as 10 per cent. In order to meet these two conditions, (a) differences in the same job, and (b) differences in men, several new principles were evolved and applied.

1. The three subjects (a) wages (b) time schedules (c) efficiency standards, are absolutely separated from each other.

2. Revision of all three are continuously undertaken as separate and wholly distinct problems that may accidentally occur in the time required for the same job on different occasions, the worker's efficiency is determined not from the individual job but from his average on the whole of his work.

Hitherto rates of pay, standard times and individual efficiency have not been sufficiently distinguished from each other, and possibly a large amount of the antagonism and bitterness between employers and employes arises from this confusing of what ought to be wholly distinct.

Comparison of Men and Rates.

The rate of pay of one man may be 10 cents per hour, of another man $1 per hour. In time, the 10-cent man may rise to $1 and the $1 man may fall to 10 cents. Neither the rise nor fall has anything to do with the man's efficiency while working. A man earning 10 cents might develop 150 per cent efficiency and a man at $1 might show only 50 per cent efficiency. High efficiency is a very good reason for promoting a man to a better position on the assumption that he will do equally well in it, and low efficiency is a very good reason for concluding that a man is on a job not suited to his talents. This is the exact opposite of piece work corrections which generally cut the rate of the efficient man and raise the rate of the inefficient man.

In the writer's system, standard times are determined initially and subsequently corrected without reference to either the rate of pay or the efficiency of the workers. Actual times in specific cases may be either low or high because of conditions which no man can foresee or control but that is no reason for changing the standards. After the standards have been determined for normal average conditions, one man may show an efficiency of 150 per cent and another man an efficiency of only 30 per cent on the same schedules. These individual variations are also no reason for changing standards.

If however, the machines are growing old, if the steel castings are continuously harder, if the power house is being overloaded, and the power is deficient, schedules may have to be raised by revision, but if new high speed tools have been introduced, if new emery wheels, new belts, new power, new dispatching systems and better crane service has been installed, schedules are revised and many will be shortened.

Revision of Schedules.

Revision of wages is one thing, wholly distinct and separate from revision of schedules. Revision of wages is undertaken without any reference whatever to schedules. Revision of schedules is never undertaken for the purpose of lessening the earnings of the men, but solely to make the latter more correct, and after revision the best men will still average the same high efficiency as before, the poorer men will still average low, because under the system of continuous revision some schedules will be raised and others will be lowered, the average remaining fair.

Constant managing responsibility for best conditions, among which are attractive rates of pay and fair and reasonable schedules, is the means used to bring about high efficiency, since high efficiency, not low wages, or mean schedules, brings about low costs. Time standards must be low enough to stimulate the best men to high endeavor and to constant co-operation in toning up the whole shop. It would be as suicidal to make the standards discouragingly low as to refuse oats to a race horse.

It is evident that the separation of the question of wages from the question of schedules, and the separation of both from the all important question of "efficiency" narrows the opportunity for misunderstanding and disagreement. Ordinarily when shop efficiency declines the first impulse of the management is to reduce wages,

but shop efficiency may fall off yet the individual efficiency of the workers rise. The bugbear of high wages never worries the manager whose plant is running at high efficiency. Neither does the bugbear of high wages worry the manager whose plant is running at low plant efficiency but at high individual efficiency, but he will at once concentrate all his attention on those conditions which are making for low plant efficiency, as short working days, frequent holidays, excessive overhead charges, wastes of material, etc.

Difference Between Cardullo and Emerson Systems.

The difference between the "Efficiency premium" and the Cardullo "Diminishing premium" are set forth both in the accompanying table and in a diagram.

The base line of the diagram is a scale of time, the upright line at the right, a scale of wages. To determine the total amount of wages for any particular time find the intersection of the upright above the time scale and the slanting wage line. Run from this intersection to the wage scale. For instance at 12 hours wages are $3.60.

The Santa Fe premium line and the Cardullo premium line are drawn above the wage line. Both premium lines begin at 18 hours, the Cardullo line sweeps in a long curve and at zero time merges again in the wage line. The Santa Fe premium line also starts at 18 hours, very gradually departs from the slanting wage line, crosses the Cardullo line at 9 hours and 20 minutes. At 9 hours 20 minutes both systems pay a premium of 48.3 per cent above straight wages. At this point they are identical. Under the Santa Fe system the most important point on which everything else depends, is "Standard time" 12 hours in the case illustrated accurately and carefully determined as a time that can be attained by a good worker who makes no mistakes and wastes no effort or time. At standard time the Santa Fe premium is 20 per cent, the Cardullo premium is 33.3 per cent. The theory of the Santa Fe system is that for standard time the worker deserves 20 per cent premium, but that for less than standard time he should receive smaller premiums until at time and a half, 18 hours (see diagram) he receives no premium.

It is assumed in both cases that the premium begins at 18 hours and that the guaranteed hourly rate is 30 cents.

In the table below the columns headed "Ef" are those worked out for the efficiency method and the columns headed "D. P." are those worked out for the Cardullo "Diminishing premium" plan.

Time taken, hours.	Premium per cent.		[3]Premium, amount.		[4]Total wages paid.		Rate per hour.		Efficiency of worker.
	Ef.	D. P.	Ef.	D. P.	Ef.	D. P.	Ef.	D. P.	per cent.
18	0.0	0.0	$0.00	$0.00	$5.40	$5.40	$0 30	$0.30	67.0
17	0.3	5.5	0.02	0 28	5.12	5.38	0.301	0.316	70.6
16	1.31	11.1	0.06	0.53	4.86	5.33	0 304	0.333	75.0
15	3.27	16.7	0.15	0 75	4.65	5.25	0.31	0.35	80.0
14	6.6	22.2	0.28	0.93	4.48	5.13	0 32	0.36	85 7
13	11.85	27.7	0.46	1 08	4.36	4.98	0.335	0.383	92.3
12	20.0	33 3	0.72	1.20	4.32	4.80	0.36	0.40	100.0
11	29.0	38.8	0.96	1.28	4.26	4.58	0 387	0.416	109.1
10	40.0	44.4	1.20	1 33	4.20	4.33	0.42	0.433	120.0
9.35	48.3	48.3	1.35	1.35	4.15	4.15	0.443	0.443	128 3
9	53.3	50.0	1.44	1.35	4.14	4.05	0 46	0.45	133 3
8	70.0	55.5	1.68	1 33	4.08	3.73	0.514	0.466	150.0
7	91.0	61.1	1.92	1.28	4.01	3.38	0 573	0.473	171.0
6	120.0	66.6	2.16	1 20	3.96	3.00	0.66	0.50	200.0
4	220.0	77.7	2.54	0.93	3.84	2.13	0 96	0.533	300.0
2	520.0	88.8	3.12	0 53	3.72	1.13	1.86	0.565	600.0
0	inf.	100.0	3.60	0.00	3.60	0.00	inf.	0.600	inf.

[3] Premium per piece. [4] Labor cost per piece.

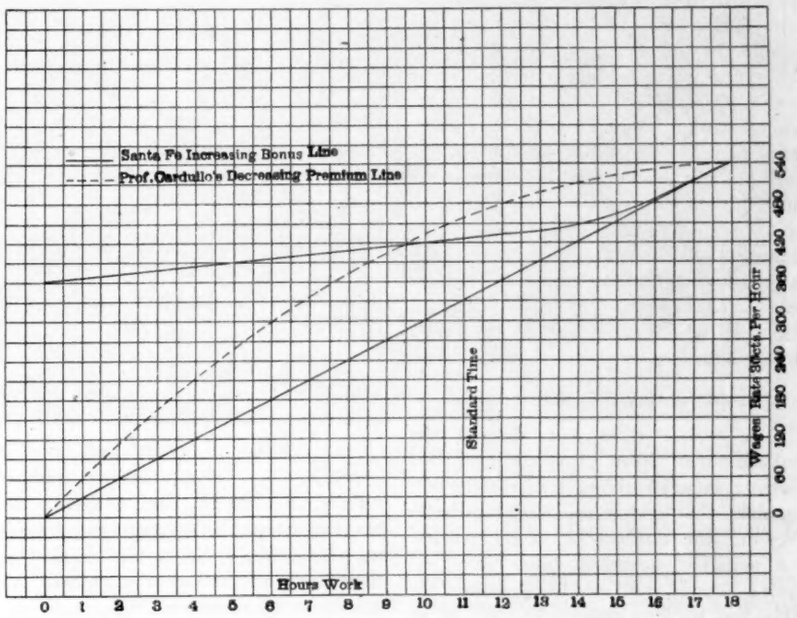
Below standard time the worker not only receives full wages for all the time he has saved below standard but he is also paid 20 per cent premium on the time he actually works. This is not only fair, but it is generous, and it pays to be generous because nothing is more valuable than high efficiency, since it saves proportionately in overhead charges.

Effect of Premium on Workers.

Even the best workers will be slow in starting on an unfamiliar schedule. Assuming that standard time is 12 hours and they start in taking 18 hours it might seem impossible ever to reach 12 hours and the worker therefore does not try or clamors for a better time. If however, some premium is offered for any reduction below 18 hours there is a constant incentive to reduce the time as the premium so rapidly increases. If any worker cannot at least make some premium the conclusion must be that he is not suited to that job, and if in a few weks he is not making standard time the schedule may be reinvestigated to determine whether the schedule or the man is at fault.

The Santa Fe system holds out very great inducements to workers of very high efficiency. The Cardullo system starts with premiums high in amount, for very small improvement and gives rewards, very low in amount for very high improvement. For instance, the man who cuts the time from 18 hours to 16 hours receives exactly the same premium, 53 cents, as the man who cuts the time to 2 hours.

It occurs more frequently than the uninitiated would think, that a worker is able to deliver a schedule in zero time. He may for instance come an hour before the shop opens, or work during the noon hour, or stay after


Santa Fe Increasing Bonus Line
Prof. Cardullo's Decreasing Premium Line
Standard Time
Hours Work
Wages Rate 30cts. Per Hour
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 60 120 180 240 300 360 420 480 540

CURVES SHOWING COMPARATIVE PREMUMS UNDER CARDULLO AND SANTA FE SYSTEMS.

time, or take home some of his work, or himself pay an assistant to help him, or he may combine two schedules into one, so arranging his work for instance as to run out a load of ashes and bring back a load of coal. Under the Santa Fe system the worker receives full credit for the schedule time of the work delivered, and he is thus encouraged to save all the corners he can.

Result of Extra Endeavor.

Under the Cardullo system the worker would receive nothing for extra endeavor of this kind. If for instance the worker had taken home Saturday a 12-hour piece of work, brought it back Monday morning and delivered it finished at 9 o'clock he would receive $1.13, namely 60 cents wages and $0.53 premium. Under the Santa Fe plan he would receive for his two hours' work 12 hours' wages, $3.60 and 20 per cent in addition on the two hours, 12 cents, a total of $3.72, if this was the only job he did during the month, otherwise he would be given credit for 10 extra hours on his efficiency account.

Mr. Cardullo's theory is that exact times cannot be reliably predetermined and that a worker might be able to do the work in perhaps as little as 10 per cent of the time set, and to prevent an unduly large earning in such a case he limits the amount of premium which a worker can earn even if the shortening of time is wholly due to the worker's own skill.

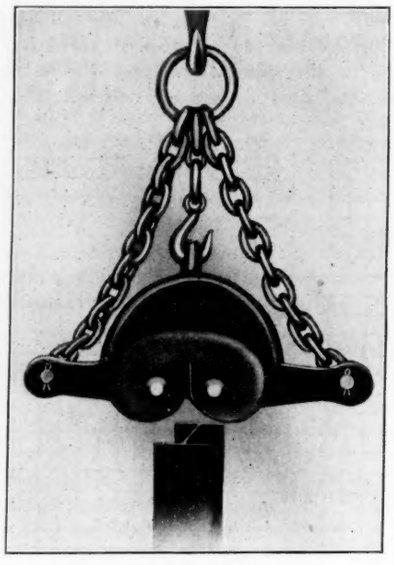
Responsibility of Management.

The writer does not absolve the management from responsibility for setting accurate times, but frankly recognizes that owing to changes wholly beyond the control of either worker or manager accurate times may require change, and so he provides for this, but he also recognizes that in an absolutely fair set of schedules special circumstances will occur which will, as to a specific schedule in an exceptional case, either shorten or lengthen the time required, the shortening of the time being a benefit, the lengthening of the time being a loss to the worker. He therefore averages all the schedules of the worker and thus virtually eliminates accidental variations.

Mr. Cardullo is afraid to give the skilled worker what he saves by his own diligence and intelligence and the writer is not afraid to give to him in the fullest measure this inducement. As Mr. Cardullo favors the inefficient worker by an offer of high premiums for small improvement he attracts this class and he discourages the man of very high efficiency by withholding from him the earning to which he is entitled. The writer discourages workers of low efficiency by offering them lower premiums than Mr. Cardullo offers, but he attracts workers of high efficiency by giving them not only all the saving in time which they make but a premium of 20 per cent on their time in addition. As a result the efficiency of a shop using the Santa Fe system will be higher and its costs lower than a shop using the Cardullo system.

Comparative Results.

Assuming an 80 per cent efficiency of the workers under the Cardullo system and 100 per cent efficiency under the Santa Fe system the following are the comparative results in shops of 500 men, with wages assumed at 30 cents per hour.



SHEET PILING PULLER.

	Santa Fe system.	Cardullo system.
Efficiency	100 per cent.	80 per cent.
Standard rate of wages per hour	$ 0.30	$ 0.30
Premium	0.06	0.05
Total cost per hour	0.36	0.35
Number of men	500	500
Total wages per day of 10 hours	1,800.00	1,750.00
Surcharges	1,500.00	1,500.00
Total costs	3,300.00	3,250.00
Output in proportion to efficiency	100	80
Cost per piece	33.00	40.60
Assumed profit, 20 per cent	6.60	
Total cost	39.60	

It may be argued that the earnings per hour of 36 cents under the Santa Fe system would not yield an efficiency of 100 per cent as compared to 80 per cent under the Cardullo system for earnings of 35 cents per hour. While this is true, nevertheless under the Santa Fe system earnings of 50 cents per hour could be given the worker before costs equaled those under the Cardullo system. But for 50 cents an hour an efficiency of 149 per cent ought to be attained with costs at $25.17 each, thus showing that even an astonishing increase in wages, if based on increasing efficiency always affects lower costs.

If, therefore, the employer and the employe could agree on a reasonable wage scale, if the employer would allow generous premiums for "efficiency," if the employe would co-operate in cutting out useless waste, if the employer also would co-operate to lessen all costs and waste then, not only could the efficient employe earn wages far above the rate guaranteed, but the employer would find his costs going down in close proportion to the increased efficiency and therefore increased pay of the workers.

SHEET PILING PULLER.

A device for pulling sheet piling has been placed on the market by the Curtis & Co. Mfg. Co., St. Louis. It is made entirely of steel, the jaws being 4 inches wide, provided with case hardened teeth. The short chain shown in the illustration holds the jaws apart. When this chain is released, the jaws clutch the piling and the greater the pull the tighter the grip exerted. The chain used is ¾-inch, made of refined iron. The machine is simple and requires practically no maintenance.

The Wisconsin Zinc Co., organized under the laws of Maine, has filed articles to operate in Wisconsin. The capital stock of the company is given at $1,000,000, all of which will be invested in the zinc mines of southwestern Wisconsin. The principal stockholders of the company reside at Portland, Me. The incorporators are: L. L. Hight, W. M. Pike, H. L. Cram, H. P. Sweetser, all of Portland; C. A. Hight and P. E. Coyle, Brookline, Mass.; F. W. Batchelder, Weston, Mass.; E. P. Thompson, Arlington, Mass.; and W. H. Coolidge, Newton, Mass. Fred Krog, of Platteville, is the representative of the company in Wisconsin.

The LaBelle Iron Works has completed oil well No. 13 on its own property in the Follansbee pool, Brooke county, W. Va., and it is showing 150 barrels natural flow.

PUNCHING, SHEARING AND SHAPING MACHINERY IN THE WAVERLY WAREHOUSES

The new Waverly warehouses of the Carnegie Steel Co., are interesting in a number of ways, not the least from the standpoint of their equipment. The accompanying illustrations present two views of a massive machine installed by R. S. Newbold & Son Co., Norristown, Pa., a standard interchangeable coping and punching machine equipped with a complete set of coping and trimming knives for handling beams from the lightest sections up to a maximum of 24 inches. The design of the machine is such that it is not necessary to reverse the beam or piece being trimmed. As the beam passes on its edge through the cutters, the flange is trimmed on each side by shifting the section sideways. When one end is finished the beam is then passed through the knives and the other end finished without reversing or returning, only the passing in the two directions being necessary, as each stop is utilized for an operation.

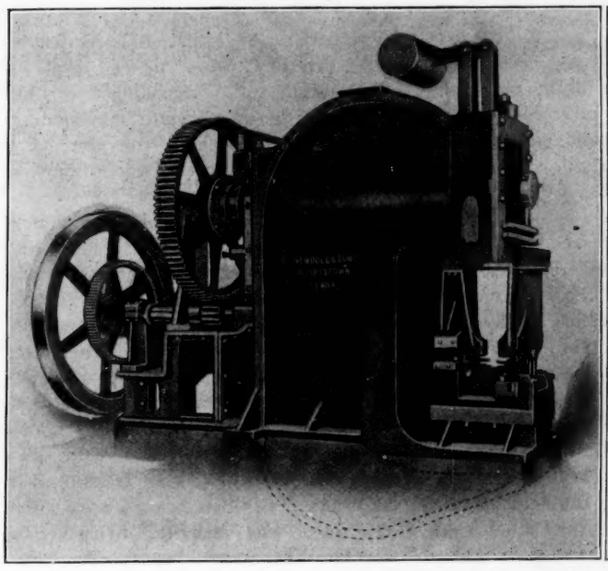


FIG. 1—24-INCH INTERCHANGEABLE COPING AND PUNCHING MACHINE FITTED WITH COPING AND TRIMMING KNIVES.

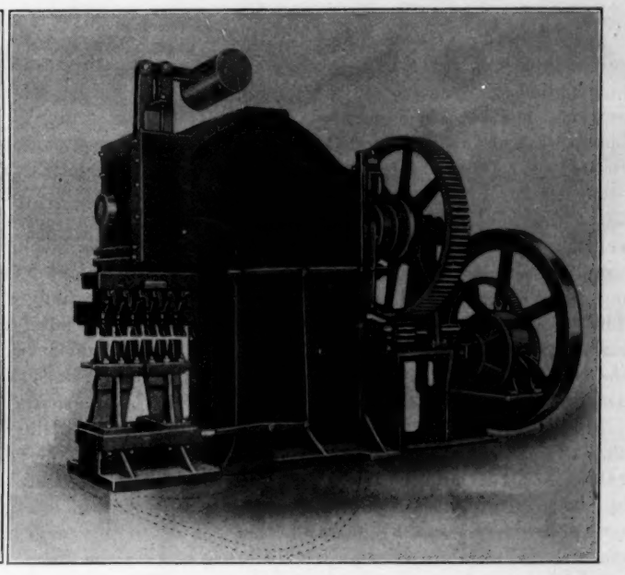


FIG. 2—INTERCHANGEABLE COPING AND PUNCHING MACHINES FITTED WITH GAG PUNCHES AND DIE.

The operation of the knives is controlled by an automatic throw out and stop clutch of simple construction. The clutch is hinged, as shown, to a lug on the main frame and is thrown into gear by a spring in a saddle which is swivelled midway on the length of the clutch lever. The clutch is held out of gear by means of a pin and roller balanced and operated either by hand or foot at the side of the machine. The balancing of this pin drops it into a safety ring which would not permit of the clutch engaging until the pin is removed.

Great care has been taken in the design of this machine to make all parts accessible, and all wearing parts are fitted either with removable or adjustable plates to maintain the alignment and to reduce the maintenance cost to a minimum. All the knife blocks, heads and wearing blocks are of steel. The main shaft is of 45 carbon hammered steel and the eccentric boxes are of cast steel, provided with a wearing bushing on the inside and top and bottom wearing plates of hard bronze, necessitating the use of only a small amount of expensive material to renew entirely the original sizes. The gears are cut from the solid throughout, and the flywheel is turned and balanced. The machine weighs about 60,000 pounds. All the bearings are fitted with removable bronze bushings and are aligned and mounted on auxiliary castings bolted solidly to the main frame to prevent any mis-alignment of parts, dowel pins being provided at each joint. The machine is operated by a 15-horsepower Westinghouse direct-connected compound-wound motor and is geared to make sixteen cuts per minute. Fig. 1 shows it equipped with coping and trimming knives, operating as above described.

In Fig. 2 the same machine is shown, fitted with a set of gag punches and dies arranged on blocks, suitable for punching the flanges of angles, channels or beams, or of the web of the same members, or of any joint plates that would be necessary in framing up to the maximum size. In operation, the punches not necessary for the row of holes are made inoperative by the withdrawing of the blocks. The capacity of the machine is six 1-inch holes through 1-inch plates.

At the same plant the Newbold company has also installed a 48-inch gap punch and shear, which is illustrated in Fig. 3 and is designed for either structural or plate work. In its driving mechanism and other details of construction this machine is similar to that already described. Particular attention has been directed to the arrangement of the punches with their gags. A feature is the adjustable strippers which can be raised or lowered to suit any thickness or widened or narrowed to suit any width or accommodate any number of punches up to the capacity.

The die blocks rest on a steel base which, in turn, is bolted to the main frame of the machine. These are

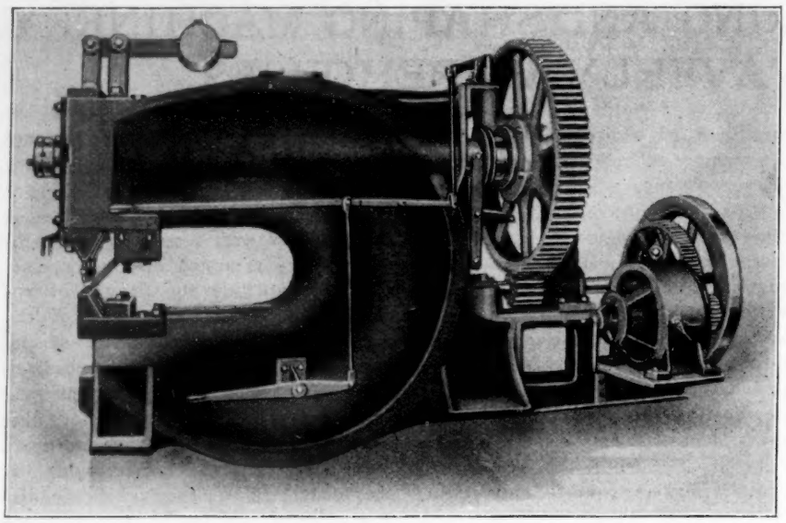


FIG. 3—48-INCH GAP PUNCH AND SHEAR.

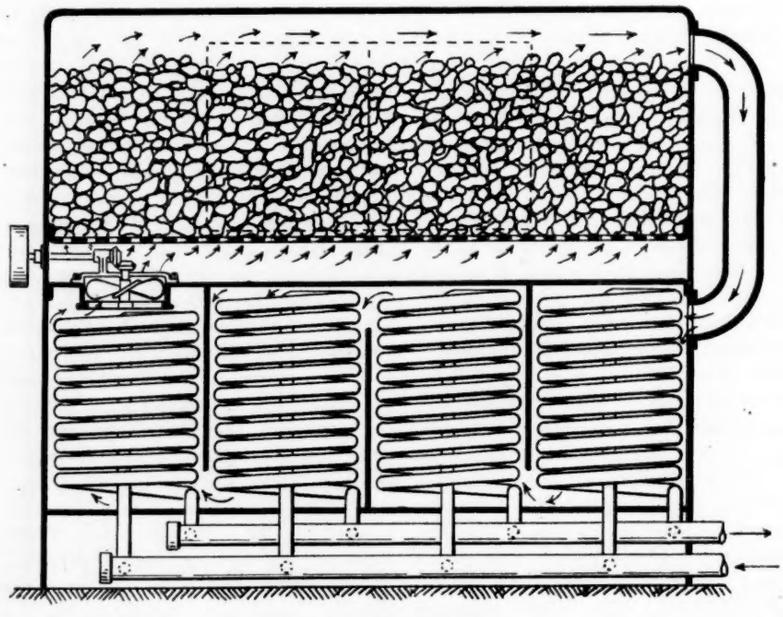
fitted with dowels which engage in corresponding grooves in the base and are held in their positions by a clamp, as shown, secured firmly to the block. This method insures an absolutely true alignment at all times as to depth of throat and provides a very easy adjustment sideways by simply loosening the clamp and moving the blocks to and fro as desired. The head, gag blocks, die blocks, clamp and base are all of steel, while the other parts are of material as described in the other machine.

The capacity of the machine as shown is four 1-inch holes through half-inch plate with flat punches and up to a 1-inch hole in three-quarter plate with spiral punch. This machine is also fitted with top and bottom knife holder and knives for slitting plates and will handle three-quarter-inch plate. The knives are 24 inches long and the weight of the machine is about 30,000 pounds.

A PROCESS FOR COOLING COKE.

A process for cooling coke is the subject of a patent (U. S. No. 842747) granted to Charles E. Arnold, Wilmington, Del. The object in this process is to quench the coke without giving it an undue amount of moisture. The apparatus used is shown in the accompanying illustration and comprises a chamber divided into two compartments, the lower one of which is filled with coils connected to a suitable cooling water supply. The whole receptacle is air tight and the upper portion is reserved for the introduction of the burning coke.

Hot coke being introduced into the upper receptacle by suitable means, not shown, and the doors sealed, the oxygen in the air in the receptacle is quickly exhausted by the burning coke, leaving in it only a mixture of nitrogen, carbon dioxide and carbon monoxide, none of which will support further combustion. These inert gases are blown through holes in the bottom of the coke receptacle and through the coke and removed from the upper portion of the receptacle by means of a conduit which leads to the lower receptacle containing the cooling coils. The gases pass over the cooling coils, giving up their heat to them and are then forced through the coke, the operation being repeated indefinitely until the coke is sufficiently cooled. The objects claimed to be of advanage in this process are the securing of an absolutely dry coke and the production of a stronger coke. The importance of dry coke is readily perceived, as moisture sometimes increases the weight of the coke to be handled 10 or 12 per cent, and increases the amount of coke required per ton of iron produced in the blast furnace, inasmuch as an extra heat is required to vaporize the moisture in the coke. By increasing the strength of the coke certain coals can be utilized for coking, which are unavailable when it is necessary to quench them with moisture.



COKE COOLING CHAMBER.

STEEL BELTING.

In a recent issue of a German technical paper, the use of steel bands to take the place of leather belting for the transmission of power is stated to have proved practicable after repeated tests by a firm in Charlottenburg. According to an American consular report, the points of superiority claimed for this new method for the transmission of power are as follows:

On account of its solidity a much narrower band can be used, one-sixth of the width of the usual leather band being sufficient; as a result of this, the steel band is not so heavy as the usual leather band, and, as it can be very tightly adjusted, the distance between the engine and the machine is not a matter of importance, as is the case with leather belting, where the transmission of power is dependent upon the weight of the hanging belt; by a

unique contact, the slipping is much reduced, experiments having shown that this does not exceed one-tenth of 1 per cent. Careful and repeated experiments have shown that the entire loss of power is very small, and as far as can be ascertained will not exceed 1 per cent. Further, owing to the light weight of the steel belting, it is claimed, the influence of the centrifugal force is not so great, permitting a much increased velocity.

LEATHER BELT CONSTRUCION ALONG NEW LINES.

A new type of leather belting recently placed on the market by the Laminated Belting Co., 51 Beekman street, New York City, possesses a number of important features resulting from the unique method employed in its manufacture. This belting which very properly has been given the name of "Edge-On," is built up of a large number of strands cut in spiral form from the butt. These strands are placed on their edges and sewn together, the result being a cementless belt. As the strands are cut in a circle, it is only necessary to increase the depth of the cut to secure increased thickness in the belt, in contrast with the ply on ply method ordinarily employed. The accompanying illustration shows the manner in which the splice is made, the feature being that there is no sacrifice of strength resulting; the belt is practically endless. Before the strands are assembled, they are stretched separately and then, when they have been laminated together, all are stretched equally in the finished belt, so that the product is practically stretchless when placed upon the pulleys under proper tension. A perfectly plain surface is constantly presented to the pulleys, there being no laps to open, and the method of cutting the leather makes the belting naturally conform to the shape in which it operates. Any length or thickness can be secured without impairment of strength, pliability or cohesion. Excellent results have been obtained with installations already operating. At the plant of the Clark thread works in Newark, N. J., a main belt 168 feet in length by 21 inches in width has been in service for some time and another 142 feet long by 24 inches wide has been ordered. This belting, having no metal fastenings in splices or joints, is particularly well suited for installation in electrical plants.

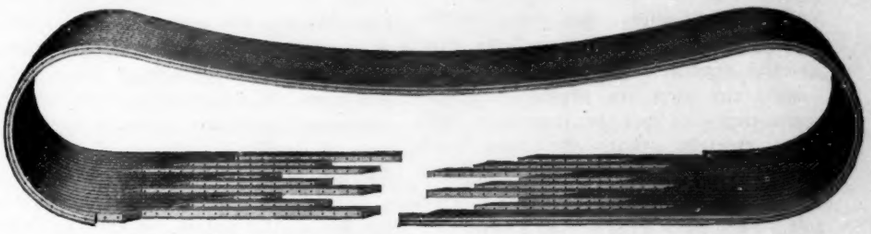
AUTOGENOUS WELDING AND ITS APPLICATION TO AUTOMOBILE CONSTRUCTION.[1]

In dealing with the possible application of autogenous welding to the construction and repair of automobiles, the writer appreciates that the subject is so comparatively new, that its practical field of usefulness has not yet been clearly and definitely defined. It would seem from the applications of the process which have been carried on abroad, that autogenous welding supplies automobile builders with a means of accomplishing many results, which have heretofore been achievable only by costly and difficult methods.

The process consists of placing in contact the two parts which are to be welded, after which the operator directs upon the line of junction a blow pipe flame, usually of air and acetylene, capable of giving a temperature of at least 1,600 degrees Cent. Fusion of the metal takes place at the point where the flame strikes and the welding of the two parts is thus effected. The operator's skill, when operating upon small pieces, consists in stopping the action of the flame at the moment when fusion has proceeded so far that solidification is assured, and before it has advanced to the point where the piece might be destroyed or pierced. It is indespensable further that the blow pipe flame should not be oxidizing, but rather decidedly reducing. In automoblie work, a modified form of the Fouche welding burner, employing acetylene and oxygen has been found most desirable.

The chief interest in oxy-acetylene process at present is confined to welding, which can be used in innumerable ways in connection with automoble construction. It is probable, for example, that nearly all of the riveted joints in frame construction can be eliminated, and the pressed steel cross frame members, gusset plates and sills be united by the welding flame, so as to form one solid piece. Pressed steel, drop-forged or wrought iron step hangers, brackets for jack shafts, springs, guards, etc., can be neatly and rapidly made one with the frame. Drop-forged or cast steel spring horns can be firmly united to the pressed steel side members of the frame, and wherever cracks or unsightly joints might ordinarily be left, these can be completely filled and dressed off, making a much more finished job than by the usual methods.

Parts which require mild steel centers, but should have high carbon steel rims, such as gears, can be built up by the use of this process. Brass handles can be joined to steel shanks, or brass heads can be affixed to screws which require steel shanks for strength. By the use of this process, it would also be possible to make many parts which are now turned or forged from the solid out of pressed steel pieces welded together. Autogenous welding is also extensively applicable to repair work, particularly the repair of broken parts. Lugs, or peculiarly shaped projections, which have been worn or broken off, may be replaced easily by this process.



THE MODE OF CONSTRUCTING LAMINATED BELTING.

In discussing the paper, Mr. Ford, of the Ford Motor Co., inquired whether autogenous welds were of sufficient strength to withstand the shocks incident to automobiling. Mr. Foljambe replied that the weld is perfect, that the strength of the material is only slightly reduced and that the elongation is not detrimentally depreciated. Mr. Newman inquired if the per cent of reduction of elongation, due to welding, was the same, regardless of the per cent of elongation of the original material. Mr. Foljambe replied that this was practically the case.

[1]Abstract of paper by E. S. Foljambe, read at the June meeting (Detroit) of the Society of Automobile Engineers.

The Ohio Falls Iron Co., New Albany, has resumed operating in every department, with 500 men at work. A large number of orders are said to be ahead.

SOME FEATURES OF THE STEEL RAIL SITUATION[1]

An Exhaustive Discussion of the Difficulties Confronting the Railroads and the Problems to be Solved by the Steel Rail Manufacturers

By Charles B. Dudley.[2]

The Bessemer steel rail has a marvelous history. The outgrowth of an attempt to make wrought iron cheaply, it came in just at the time when the wrought iron rail was beginning to demonstrate its unfitness to stand pounding of the larger locomotives of the day. It perhaps is not too much to say that the Bessemer steel rail has made the modern railroad possible, and that without it, or its equivalent, the world's development would be half a century behind its present advanced position. And yet, notwithstanding all its merits, and its wonderful record in the past, no candid mind can view the present steel rail situation and not be impressed with the thought that the steel railroad rail, or perhaps more comprehensively, the railroad track of today, is called upon to justify itself in the eyes of the public.

No record of past success, however wonderful it may have been, will suffice to meet the present conditions. The changes in methods of transportation during the last quarter century, the increase in sizes of cars and locomotives, with the consequent increase in wheel loads, and in the strains produced, have made new demands upon railroad tracks, and especially upon the rail, as the most important element in the track. It is plain, we think, that modifications at some point, and possibly at many points, are essential, in order that the new conditions may be successfully met.

The startling record of rail breakages which has characterized the past two or three years, the rapid wear, and the almost appalling deterioration, due to crushing and flattening, of rails in track, have produced an outcry against the steel rail, which, seconded by the technical press, has culminated during the past two years, in a charge of criminal negligence on the part of those engaged in the manufacture of this great essential of railroad operation. No one at all conversant with the situation can successfully maintain that the subject is not a pressing one, and I am sure that all will agree that there is necessity for calm, cool, dispassionate consideration of the various elements involved in the problem.

Changes in Operating Conditions.

First, let us briefly consider the changed conditions. It is surely not too much to say that in the past 25 years the changes in the conditions in which the rail is involved, have in three respects been most noteworthy. 1. The average speed of trains has been largely increased. 2. The average wheel loads of cars have been increased 75 per cent, and of locomotives over 100 per cent. 3. On some of the larger and more important railroads, the volume of traffic has increased at least 300 per cent and perhaps more.

The influence of increased speed on the life of the rail is not easy to estimate, nor indeed can much that is positive be said on this head. Undoubtedly some of the shocks which the rail must sustain, are increased in severity by higher speed. This, we think, is clearly the case when a high speed train passes over a loose joint. The end of the rail which the wheel is approaching, must have a more severe blow with a fast train than is given by a slower moving one. On the other hand, there seems to be some evidence that for those strains, whose severity is effected by the length of time the load is applied, the increase in speed may not be so injurious an element.

Increase of Wheel Loads and Traffic.

The increase in wheel loads is a more important matter. Without going into the mathematics involved, and ignoring the apparently unsolved problem as to whether the rail under a moving load sets exactly like a beam supported at both ends and loaded in the middle, there is seemingly fairly good evidence that, all things else remaining the same, doubling the wheel load approximately doubles the strain in the metal. It follows, therefore, when wheel loads are doubled, either that the rail section and supports in use at the time must have sufficient margin in them to safely endure these doubled strains, or that some changes are essential.

The increase in traffic is also a very important matter. No point in the science of strength of materials, if we may use the expression, is apparently better established, than that repetition of stress, has a direct bearing on the life of the part so strained. There is much indication, and the evidence is rapidly increasing, that the life of a rail, not only as regards wear, but also as regards its freedom from disintegration and breakage, is a function of the number of wheel loads that pass over it. We are strongly inclined to the view, therefore, that we are on firm ground when we say that even though we grant that the rails made 20 to 25 years ago were good and gave satisfactory service, it is clear that the changed conditions of the present day, especially the heavier wheel loads, and the increase in traffic, demand changes in the practices that were prevalent at that time.

Improvement by the Railroads.

Let us examine this matter a little, and ask ourselves the question plainly. What have the railroads done to meet the changed conditions? First and foremost, the weight of the rail per yard has been increased. As a matter of record, it may not be amiss to mention the successive steps of this increase on one large railroad. Within my own memory and study of this subject, the following weights of rail have been employed: 56 pounds per yard, 60, 70, 75, 85 and 100. The increase is quite noticeable, the latest form being nearly double the weight of that first used. The battle of the sections, or the form in which the increase of weight has been disposed, will be referred to later on.

But it may be said, "It is granted that the weight of rail has been increased, but what evidence is there that the increase has been sufficient? Is not a rail weighing 110, 120 or even 130 pounds per yard, essential to meet the strains produced by the changed conditions above referred to?" Upon this point it is possible to say that most careful studies have been made, using the best obtainable data, and making allowances for what is more or less unknown and uncertain, and that the studies indicate that the weight of rail to carry the increased wheel loads, has been increased more rapidly than the wheel loads, and that

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[1]Presidential address before American Society for Testing Materials at the Atlantic City (June, 1908) meeting.

[2]Chemist Pennsylvania Railroad, Altoona, Pa.

the actual strain in the heavier wheel loads, is no greater than was the case in the lighter rails under the lighter wheel loads formerly employed. It may be added that, if 12,500 pounds per square inch is assumed as a safe working stress for such steel as rails are made of, the present 85 and 100-pound rails show stress well within this limit, even under a static wheel load of 30,000 pounds, with a dynamic augment of 60 per cent of the static load. If these studies can be trusted, therefore, it would seem that so far as the weight of the rail is concerned, the railroads have done all that could reasonably be required to meet the changed conditions with which we are dealing.

More Than Heavier Rails Needed.

But again it may fairly be asked, we think, whether increase in the weight of the rail is all that is required. No principle of structural construction is better established, apparently, than that the support which material under strain receives is an essential element in its successful behavior. The rail alone cannot carry the load. It must be properly supported and perhaps failure to properly support the rail may account for some of the rail failures, of which we have heard so much during the past few years. Good railroad track involves a properly drained sub-grade, ballast, ties and rail fastenings, splice bars, and other joint material, and the proper assistance of these, as well as rails. In other words, the rails are only one of the elements in the problem. It would be manifestly unfair to blame the rail for failures which may be clearly due to defective support or fastenings. What, then, have the railroads done during the past 15 to 20 years, in the way of supporting the rail, to enable it to successfully meet the changed conditions, we are discussing?

Tie Spacing.

First, as to ties. It is well known that with the advent of the heavier rail, some railroads actually diminished the number of ties per rail. This may have been all right during the transition period, but it is manifest that the strain in the rail is increased by such practice. More recently as the number of heavier cars and locomotives has increased, we believe the number of ties has been increased again, until now in the best tracks, as many ties are used as can successfully be employed, and leave room for tamping. It may not be amiss here to call attention to a characteristic of ties that bids fair to be of increased importance as time progresses. Owing to the continually diminishing supply of forest products, it seems fair to expect that the supporting face of the ties under the rail, will gradually be less as the necessity for using smaller ties increases. This will clearly lead to an increase in strain in the rail, and may even now be an element in the problem. Perhaps the general use of a tie plate on wooden ties, or the development of an entirely successful steel tie, may obviate this difficulty before it becomes too serious.

Joint, Splice Bars and Ballast.

The joint and the splice bar and fastening have received an immense amount of study during the past 20 years, and while it would probably be too much to claim that the problem has been completely solved, no accusation that the railroads have been idle in this respect, can be successfully maintained.

The ballast holds the ties in place, distributes the strain produced by the load to the sub-grade beneath, and undoubtedly performs some function in drainage. Taken in general, it is undoubted that there has been gradual increase in ballast, as the wheel loads and traffic have increased. That it has reached the proper thickness yet, even on those tracks which are best maintained, we fancy no one would be willing to affirm. We believe there are engineers who think that twice or even three times the present standard thickness of ballast is requisite, in order that the load may be properly distributed over the supporting surfaces beneath.

Importance of Sub-Grade.

The sub-grade is the foundation and as such is unquestionably one of the most important elements in the problem. No amount of money spent on rails, ties, splices and ballast, will give successful results, on an inferior sub-grade. Our belief is that the importance of the sub-grade has not been sufficiently appreciated by engineers in the past. Indeed there are indications that rail failures are a question of geography. The same rail with the same locomotive and cars and the same density of traffic, will have far less failures, if the sub-grade is sandy, porous, and well drained, than if the sub-grade is dense, heavy clay, which tenaciously holds water, and for quite a portion of the year, may be called a more or less modified mud hole. The great enemy of the trackman is water, and our firm belief is that if more study had been put on the problem of keeping water out of the sub-grade, fewer rail failures would have characterized the past.

Maintenance of Track.

The maintenance of track, that is the amount of money and labor put upon the track to keep it up to its work, tamping ties, screwing up track bolts, keeping up renewals, giving heed to drainage, etc., has necessarily increased as the wheel loads have become heavier, and the density of traffic has increased. I know of no evidence that indicates that there has been a blameworthy falling off in any of these respects, with the advent of the heavier rail. It is undoubtedly true that track expenses, even with the same maintenance of line and surface, show a tendency to diminish, the heavier the rail. It is easy to see why this should be so, since the heavier and stiffer the beam, the more the strains produced by the moving load are distributed, and consequently the less need that money should be spent to cause each minute part of the support to do its maximum duty.

And this brings us to an exceedingly interesting phase of the rail problem. During the past year or two, in discussions and committee meetings over rail specifications, the desire on the part of some railroad engineers, has occasionally cropped out, to have a rail of minimum weight per yard, and yet so good that even though the track might not always in every detail be kept up to standard, there would still be no failures. According to their view if the rails were what they should be, inferior track maintenance would be a very small matter. And singularly enough, it seemed to be a little difficult for these engineers to see that this unloading of the whole problem upon the steel rail manufacturers, was not entirely legitimate and praiseworthy. We hope to pay our respects to the steel rail manufacturers a little later, but we are compelled to say that this view of the case, does not commend itself to us, and that we do not think responsibility can be so easily shifted to other shoulders. No one can be more desirous of good rails than we are, but failures in track maintenance cannot, we think, fairly be put upon the rail. On the other hand, we do think there is a legitimate question connected with this phase of our subject. This is, the requisite safety be-

ing always maintained, where does true economy lie in this contest between the rail and the track maintenance? There are three possibilities.

Considerations of Improved Track.

1. Would better rails with the same weights per yard as are now in use, even though obtained at increased cost, result in such diminution of track expenses, that economy would result?

2. Would the same so-called inferior grades of steel that is now being furnished, with increased weights per yard, it being conceded that increased weights per yard, are not essential from the standpoint of strains, result in such diminution of track expenses, that economy would follow after paying for the increased weights?

3. Would better steel and increased weights per yard, at even still greater cost, be followed by such saving in other track expenses, that it would be true economy to obtain such rails?

We do not believe the data exist at the present time, that would enable a satisfactory answer to be given to any of these three questions. And yet they seem to us to open up an extremely important field. It costs a certain amount each year to maintain a mile of track, including rail renewals, and we have never seen any figures, that show that the distribution of the expense to each item is such that the sum total is a minimum. Perhaps better rails, perhaps heavier rails, perhaps the two combined, even at greater cost for rails, would bring about this desired result.

Returning now to our query as to what the railroads have done to meet the changed conditions produced during the last 20 years or more, by heavier wheel loads, and increase of traffic. It is difficult to see how any fair minded person can think that the railroads taken generally and as a whole, have not made a sincere effort to meet these changed conditions. It is granted that the action taken may not always have been the wisest action, that failures and mistakes have been made, and indeed, it is undoubted that at times and places, more vigorous action should have been taken, and that too frequently there has been a disposition to lay the whole burden upon the steel maker, and yet notwithstanding all this, it would, we think, be hard to maintain that there has not been much sincere, conscientious and faithful effort on the part of the railroads to meet the problem due to changed conditions, with which they have been confronted.

Work of the Rail Maker.

Let us turn now to the record of the steel rail manufacturer in this matter, and ask ourselves calmly and dispassionately, what has he done during the past 15 or 20 years to assist in meeting the changed conditions, about which so much has already been said? Has he made better steel? Has he spent time and money and brain power in faithfully trying to improve his product? Has he heartily and earnestly co-operated with the railroad engineer, in his efforts to maintain safe transportation of persons and property?

Before trying to answer these questions let us spend a moment with this problem of responsibility. It has already been hinted several times, that there are railroad engineers who would be quite willing to put the whole burden of rail failures on the steel makers, and on the other hand, it is quite as certain that the steel makers seem to have been not only willing, but as a matter of fact have again and again washed their own hands entirely of responsibility in this matter, and claimed that it was simply a question for the inspectors and engineers. We have heard them say in effect, not once, but many times, "Our mills are open to you. Here are the rails. Take them or leave them," thus practically putting the whole responsibility of accepting and using defective and inferior material upon those who from the nature of the case cannot know as well as the manufacturer, which are good and which are bad, and who many times, have no alternative but to take what they can get. Not so do we understand the relation between the producer and consumer. From the nature of the case, the producer has essential information, that the consumer does not have, and on the other hand, the consumer has essential information that the producer does not have, and it is only by working together conscientiously, honestly and harmoniously, that the best results can be obtained We do not understand that the manufacturer of any material for the use of a public service corporation, where safety to human life is involved, can properly assume an air of indifference, which he as the maker of the materials has and the consumer does not, or can justly fail to co-operate in every reasonable way to the end that only safe material goes into the tracks.

This making of steel rails for use under high speed passenger trains, is something more than a mere commercial proposition. Both the producer and the consumer have great responsibilities in this matter, and neither can lay them aside or shift them upon the other.

Criticism of Rail Manufacturers.

Coming back now to our query as to the behavior of the steel rail manufacturers during the past 15 to 20 years. We are frank to say that with the most sincere desire to be strictly fair in this matter, we cannot regard this behavior as eminently praiseworthy. There has been far too much antagonism, far too much holding back essential information, and far too great a failure to co-operate. Many within the sound of my voice will bear me witness that in conference over steel rail specifications, it has many times been simply impossible to get such information from the representatives of the steel makers, as would enable critical points in the specifications to be wisely decided. And this is not the worst of the matter. Within two years past, entirely reputable engineers of railroad companies, have said in my presence, that they had been told by rail manufacturers, that if they did not take the rails offered, irrespective of specifications and tests, they would not get any. Still further, if I may judge from my own experience, it is only within the past year or perhaps year and a half that it has been possible to have what might fairly be called a consultation with the experts of the steel rail makers, over any point that involved the quality of the products, in any conciliatory, co-operating way. Far too much, we fear, the manufacture of steel rails has been studied in the past, simply from the commercial standpoint.

Quality of the Steel.

And how about the steel itself? Is the steel that goes into rails today better or worse than that made 15 or 20 years ago? It is well known that there is a general belief among railroad engineers, that the steel in rails today is nothing like as good as it was 20 or 25 years ago. We are not quite able to follow these critics to the extent that they want to go on this point. Our judgment is that in two respects there is reason to think the steel in Bessemer rails is inferior to that made 25 years ago.

1. The larger ingots of the present day necessarily lead to increased segregation and in so far as segrega-

tion is a serious element in the quality of steel, there is little room for doubt that the steel in the rails of today is inferior to that made some years ago. We think it fair to say that there is need for further study as to how far segregation apart from internal physical defects with which it is so often associated, is a menace. We cannot help wishing that it was not in the rail to anything like as serious an extent as many analyses show it to be, but at the same time, if the ingot was thoroughly sound throughout, we should like to study segregation farther before feeling willing to say the final word.

2. In so far as the more rapid working of the Bessemer process which has seemed to characterize its full commercial development during the past 20 years or more, has led to incomplete action between the final additions and the blown metal, and no higher finishing temperatures in the finished rail, the metal must be inferior. The making of steel is a chemical process, and every chemist knows that all chemical reactions require time, and it is to be feared that Bessemer metal is, many times, cast in the ingot mold, before the reactions are complete. The effect of this is certainly bad. Sound ingots cannot be obtained in this way, and if the ingot is unsound, good rails cannot be made. Again we are quite well aware that high finishing temperatures are blamed on the rail section. Thin flanges by cooling too soon, seem to make it impossible to roll the head at the proper finishing temperature, and, it is to be confessed, that in as far as the section is responsible for too high finishing temperature, the steel maker cannot fairly be blamed. But for all other causes leading to too high finishing temperatures, it is difficult to see how the responsibility is to be shifted. Notwithstanding these, as we regard them, just criticisms of the later made Bessemer steel, it is undoubted that a large percentage of the output of rails of the last 20 years has been approximately as good as that previously made. We are inclined to think that those who so vigorously denounce the later made steel, forget the enormously increased traffic which these rails have carried. The lack of reliable figures showing comparative tonnage of the earlier and later made steel, is a very serious handicap in reaching a satisfactory conclusion in this matter.

Need for Better Steel.

But whether the earlier or later made steel is better or not, it is certain that the need of today is for a steel even better than that earlier made. The speed is greater, the wheel loads are greater, and the tonnage is greater, and the steel to successfully meet these changed conditions, should also be better. Do we find then that during the last 20 years there has been real conscientious study on the part of the Bessemer steel maker, as to how to make better rails? Are the ingots any less unsound, and more free from shrinkage cavities, pipes, gas bubbles and blow holes? Have any of the suggested means of overcoming or minimizing segregation, and diminishing the pipe been tried on Bessemer ingots? Have any of the Bessemer steel rail manufacturers or their experts contributed something toward the solution of the problem of how to secure safer and better rails? Have they welcomed and seemed willing to fairly try suggestions that might possibly lead to improvements in their products? Have they willingly accepted more frequent testing, to the end that inferior material might be kept out of the tracks? In so far as they have done honest conscientious work in any of these directions, let all honor be given them. In so far as they have failed, let us not add to their shame by discussing this phase of our subject farther.

(To be continued.)

HYDRO-ELECTRIC INSTALLATION AT THE MINES OF THE PENN IRON MINING CO., VULCAN, MICH.

Thomas W. Orbison and Frank H. Armstrong, in a paper read at the June meeting of the Lake Superior Mining Institute, describe the hydro-electric plant of the Penn Iron Mining Co. at Vulcan, Mich. This plant is noteworthy, because it is the first instance of the exclusive application of electric drive to the machinery of a Lake Superior iron mine. It is also the first recorded mining installation of electric driven turbine pumps handling large volumes of water. The use of electricity, which was decided upon after careful consideration or other schemes, was found to be 14 per cent cheaper than compressed air, its nearest competitor.

Power is derived from Sturgeon Falls on the Menominee river, which delivers 2,880 horsepower to the turbines at ordinary stages of water.

The generating machinery consists of a line of four pairs of 45-inch horizontal turbines in tandem, built by James Leffel & Co., Springfield, O., direct-connected to a 1,500-kilowatt, three-phase, 60-cycle, 6,600-volt, alternating current generator furnished by the General Electric Co. At a pressure of 6,600 volts, current is transmitted to the mines about three miles distant, where it is distributed through the usual arrangement of sub-stations and transformers.

All the machinery at both the West Vulcan and East Vulcan mines is driven by electricity. General Electric induction motors are used throughout. The electrical equipment at the mines includes two 200-horsepower mine hoists, three 8-inch turbine pumps, discharging 900 gallons of water per minute and driven by 450-horsepower motors, air compressors, machine shops, electric light, etc.

The plant has been in operation for some time, and the results of the application of electricity to the mine machinery has fully realized all expectations.

Toledo Company Incorporated.—The Toledo Refined Iron & Steel Co., Toledo, O., has been incorporated with a capital stock of $200,000 to purchase the old Shelby steel tube plant in Toledo and engage in the manufacture of iron. The incorporators are: William W. Lindsay and William Patterson, Detroit; George E. McBride, of London, Ont., and William Caverly and Charles F. Smith, of Toledo. A main building of steel construction, 210 by 400 feet, will be erected and it together with the present buildings will be used for manufacturing refined and common bar iron. Mr. Patterson, promoting the enterprise, is quoted as saying that he has closed contracts with Detroit buyers for 10,000 tons of bar iron annually. He is further quoted as saying that after six months the plant's output will be increased by the manufacture of angles, harrow teeth and like steel products. Mr. Patterson, a former employe of the Steel Corporation and the Republic Iron & Steel Co., controls patents which the Toledo company expects to use.

The Anniston, Ala., plant of the United States Cast Iron Pipe & Foundry Co. resumed operating July 14, extensive repairs having been completed.

The Milwaukee Engineers' Society, of which E. P. Worden, of the Worden-Allen Co., is president, held its annual picnic recently at Whitefish Bay, near Milwaukee.

THE BELT CONVEYOR[1]

By C. Kemble Baldwin.[2]

Although little has been written on this subject, the prediction made 23 years ago has been realized, and today millions of tons of ore, stone, earth, coal, etc., are successfully moved on belt conveyors. This type of conveyor has firmly established itself in a field of its own.

In 1890, Thomas Robins Jr., to whose efforts, in a large measure, the success of the modern belt conveyor is due, visited the Edison mines in New Jersey, where he saw rubber belts used for handling ore in the concentrating plant; and while they handled enormous quantities with little power, the belts, the best they could buy, lasted but a few months. Mr. Robins subsequently conducted a long series of experiments to determine the proper belt construction, and the best compounds of rubber to withstand the abrasion of the material carried. Small rubber samples, each mixed differently, were exposed to the action of a powerful sand blast for the same period of time and the effects noted. These tests extended over a period of nearly two years. The result was that in 1892 belts were made which wore for four years under the identical conditions that had destroyed the old belts in three months.

Previous to arriving at the modern conveyor, we note the following evolutionary stages: Flat belts in wooden troughs; flat belts on rollers; flat belts on rollers, the runways being provided with wooden flash boards; spool shaped rollers; concave rollers, and finally the modern roller or idler, consisting of a series of small pulleys, equal in diameter, and arranged in different planes, producing a trough-shaped belt with minimum wear due to slip.

The troughing idlers should be spaced as follows, depending upon the weight of material carried: On 12-inch to 16-inch belts, 4½ feet to 5 feet apart; 18-inch to 22-inch, 4 feet to 4½ feet; 24-inch to 30-inch, 3½ feet to 4 feet; 32-inch to 36-inch, 3 feet to 3½ feet.

Oil, which always causes rapid deterioration of the rubber, should not be used in the lubrication of the idlers. Grease lubrication through hollow shafts is generally adopted.

Belts made of a great variety of substances have been used on conveyors. Stitched canvas and woven cotton belts are used, to some extent, but generally their service is not satisfactory, mainly, because it is impossible to waterproof them thoroughly. The main claim of these belts is low first cost, but they should not be used on permanent installations, particularly where out of doors, or where subject to atmospheric changes. The rubber covered belt is more generally used than any other type.

Briefly, rubber belts are made as follows: The duck is run through the calender, which consists of a series of heated rolls. This machine coats the duck with rubber, known as "friction." This frictioned duck is then cut into the proper widths and the belt is laid up to the desired number of plies, the operator using a hand or power roller to cause the plies to stick together. The cover is then put on and the belt put in the vulcanizing press, where it is subjected to heat and pressure. The belts are stretched before being vulcanized. It will be noted that the belt consists of three parts: First, the duck, which gives tensile strength; second, "friction," which cements the plies of duck together; third, the rubber cover which protects the duck from moisture and abrasion.

The longitudinal seams in the belts should be located with the utmost care. When properly placed, they cause no trouble, but when located at random, vexatious difficulties are often encountered. Too much stress cannot be laid upon selecting the proper rubber compounds for the belt coating. It is this coating which protects the belt from abrasion and determines whether its life shall be three months or three years. Rubber belts are absolutely waterproof only when the cover is intact, as the friction coats only the surface of the duck and

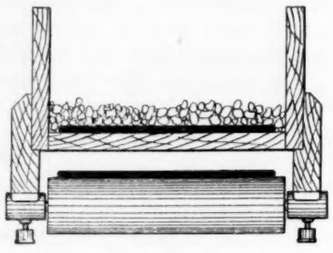

Fig. 1

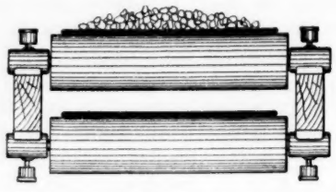

Fig. 2

Flat Faced Rollers for Belt Conveyor

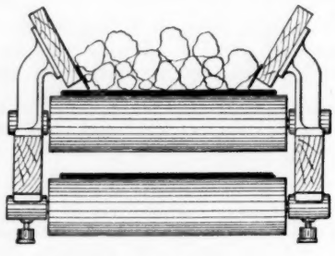

Fig. 3 Belt Conveyor with Skirt Boards

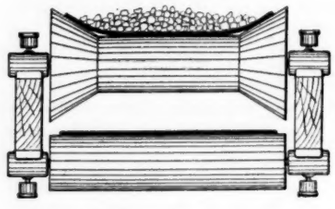

Fig. 4 Wooden Spool to Curve the Belt

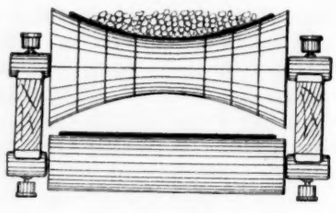

Fig. 5 Concave Roller

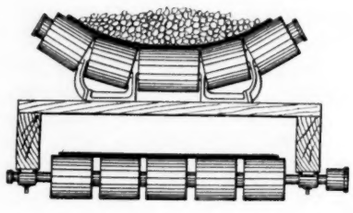

Fig. 6 Idler for Wide Belts

[1]Abstract of paper presented at the Detroit meeting (June, 1908) of the American Society of Mechanical Engineers.

[2]Chief Engineer, Robins New Conveyor Co., Chicago.

is not absorbed by it. Both cotton and rubber belts therefore, lack the property of being completely waterproof. The only belt, which, to the writer's knowledge, posseses this quality, is the Dick's Balata belt. This belt is not only waterproof, but it possesses about 20 per cent greater tensile strength than a rubber belt of the same number of plies, due to the more closely woven fabric and the greater strength of balata as a friction.

There are two points which determine the number of plies of duck making up a conveyor belt. 1. There must be sufficient tensile strength; 2, the belt should have enough stiffness to support the load properly between the idlers. The stress on the belt should not exceed 18 to 20 pounds per inch per ply on rubber belts, which may be increased 20 per cent on Balata belts. Where the power required is small, the stiffness of the belt fixes the number of plies. From 12 inches to 14 inches they should not be under 3 ply; 16 inches to 20 inches, not under 4 ply; 22 inches to 28 inches, not under 5 ply; 30 inches to 36 inches, not under 6 ply.

Vulcanized and lapped cemented splices, copper tacks and metallic lacing have all been tried in joining conveyor belts. Metallic lacing has given the most satisfaction.

The belt conveyor has one great advantage over most other types of conveyors, in that it may be driven from any point in its length. When properly designed, the drive located at the tail or loading end will prove as satisfactory as at the head. This feature of being able to apply the power to the conveyor at any point in its length is of great value in the design of plants, particularly with conveyors of large capacity.

It is frequently desirable to drive one conveyor through another, using the conveyor belt to transmit the power. For example, in a system of four conveyors, A, B, C and D, material was fed to A, which discharged to B, B to C and C to D. A motor was located at the point where B discharged to C. Power was transmitted from the head of B through the belt, and A was connected by suitable gears and chain to the tail of B. Similarly, conveyor C was driven at the tail end and D was geared to the head of C. It will be noted, therefore, that the four units were geared to a single motor located at a convenient point along the line and arranged so that they all started or stopped at the same time.

The driving machinery for the belt conveyor is extremely simple. Power is applied to one or more pulleys over which the conveyor passes. These pulleys should have heavy arms and rims with extra high crowns. They should be secured to the shafts by keys and set screws. Formerly, the driving pulleys were increased in diameter as the duty increased, so as to obtain a greater arc of contact. In recent years multiple drives have been used on the longer conveyors with the most satisfactory results.

The following table gives the minimum size of driving pulleys which should be used on the various widths of belt, dependent on the number of plies:

Table I—Minimum Size of Driving Pulleys.

Width of belt, inches.	Diameter of driving pulley, inches.	Width of belt inches.	Diameter of driving pulley, inches.
14 to 16	18 to 24	28 to 30	24 to 30
16 to 18	18 to 24	30 to 36	30 to 36
18 to 20	18 to 24	32 to 36	30 to 36
20 to 20	18 to 24	34 to 36	30 to 42

Most conveyors receive material at one end, or at various points in their length, and discharge it over the head pulley. When necessary to discharge at points along the belt, either fixed or movable trippers are used. The fixed tripper consists of two pulleys, one located above and ahead of the other. The belt passes over the upper pulley and then over the lower, in such a manner that the material is discharged from the belt into a chute, which will carry it to the side of the conveyor. The movable or traveling tripper is similar to the fixed tripper, except that it is mounted on a truck running on a track along the line of the conveyor. Thus material may be discharged at any point. Such trippers are moved either by hand, wire rope, or they are self-propelled, taking power directly from the conveyor belt. Some are automatic and self-reversing.

When the material handled is damp, it is advisable to provide some mechanism to clean the belt, after it passes over the discharge pulley, otherwise, a small quantity will be retained on the return belt.

One of the most important features of belt conveyor design is that of providing chutes, which will properly load the material onto the belt. Improperly designed chutes wil ruin the highest grade belts in a few weeks, when they should last for years. The material should be delivered to the belt in the direction of belt travel, and as nearly as possible at the same speed, so that it will go from the chute to the belt with the least possible shock or jar.

Belt conveyors may be built to handle practically any quantity of material, which may be fed to them. The following table gives the capacity, maximum size of lumps and advisable speed for the different widths of belts. This table is based on an even and continuous flow of material to the conveyor and in choosing width and speed, a full knowledge of the local operating conditions, and character of the material, is necessary so that the table may be used with judgment.

Table II—Belt Capacity and Speed.

Width of belt.	Maximum size of pieces, inches.	Capacity in cu. ft. per hour at a belt speed of 100 feet per minute.	Capacity in tons per hour at a belt speed of 100 feet per min., material weighing 100 lbs. per cubic foot.	Maximum advisable speed in feet per minute.	Capacity in cubic feet at the maximum advisable belt speed.	Capacity in tons per hour at the maximum advisable belt speed, material weighing 100 lbs. per cu. ft.
14	2½	630	31	300	1890	94
16	3	820	41	300	2460	123
18	4	1040	52	350	3640	182
20	5	1280	64	350	4480	224
24	8	1850	93	400	7400	370
30	14	2900	145	450	13050	653
36	18	4200	210	500	21000	1050

The power required to drive a belt conveyor depends upon a great variety of conditions, such as the spacing of idlers, type of drive, thickness of belt, inclination of conveyors, etc. The following formula when judiciously used will give the horsepower required to drive a conveyor.

C = power constant from table; T = load in tons per hour; L = length of conveyor between centers in feet; H = vertical height in feet that material is lifted; S = belt speed in feet per minute; B = width of belt in inches. For level conveyors, horsepower = C T L ÷ 1,000. For inclined conveyors, horsepower = C T L ÷ 1,000 + T H ÷ 1,000. Add for each movable or fixed tripper, horsepower in column 3 of table. Add 20 per cent to horsepower for each conveyor under 50 feet in length. Add 10 per cent to horsepower for each conveyor between 50 and 100 feet in length. The above figures do

not include gear friction, should the conveyor be driven by gears.

Table III—Power Required for Given Load.

1	2	3	4	5
		Horsepower		
Width of belt.	For material weighing from 25 lb. to 75 lb. per cu. ft.	For material weighing from 75 lb. to 125 lb. per cu. ft.	Required for each movable or fixed tripper.	Minimum plies of belt.	Maximum plies of belt.
14	0.226	0.143	½	3	4
16	0.220	0.140	¾	4	5
18	0.209	0.138	1	4	5
20	0.205	0.136	1¼	4	6
24	0.195	0.131	1¾	5	7
30	0.167	0.117	2½	6	8
36	0.157	0.112	3¼	6	10

The arrangement of the conveyors and the uses to which they can be put are limited only by the ingenuity of the designer. Some idea of the field covered by the belt conveyor can be obtained when we consider that it may be used to handle coal in all sizes, stone, sand, gravel, concrete materials, mixed concrete, ore, earth, wood, pulp, small packages, salt or chemicals.

The American Anti-Accident Association, of which Thomas D. West, of Sharpsville, Pa., is president, has asked the press of the United States to make special features of accidents, their causes, etc., with a view to lessening their number by arousing public attention to them.

The torch was applied to the No. 2 stack of the Woodward Iron Co.'s blast furnace plant July 14. The stack has just been rebuilt.

CONCRETE DOCK FOR THE UPSON NUT CO.'S CLEVELAND FURNACE.

At the Cleveland blast furnace of the Upson Nut Co., Cleveland, on the Cuyahoga river is being constructed a new concrete ore dock to replace the old wooden one which has become obsolete. The new dock was designed by Frazier & Fox, consulting engineers, Cleveland, and the contract for its construction was let to the Great Lakes Dredge & Dock Co.

Two sections, termed the north dock and south dock, 308 feet and 511 feet long, respectively, are being built. The concrete rests on a foundation consisting of four rows of oak piles. The piles in the outer row are 45 feet long, those in the two center rows are 35 feet long, while those in the inner row are 30 feet.

The first row of piles is backed by a 9-inch wall of sheet piling made of three 3-inch planks interlocked. The space behind the sheet piling is filled with sand, faced on top with a 3-foot layer of stone or slag, upon which the concrete rests. The heads of the piles are bedded in the concrete. The dimensions and general shape of the dock are shown by the accompanying drawings. Two oak wales spaced 5 feet apart are on the face of the dock, forming a buffer for incoming vessels. The upper wale timbers are 12 by 12 inches; the lower 12 by 14. The dock is provided with cast iron mooring posts set 2 feet 9 inches from the face of the pier and spaced 40 feet apart. These mooring posts are fastened to the concrete by 2-inch bolts fitted on the lower ends with washers and square heads. Three reinforcing rods are placed diagonally in the pier under each mooring post. The toe of the pier is also reinforced with bent rods, as is shown on the drawing.

Careful attention has been given to the problem of properly stiffening and anchoring the dock. One and three-eighths-inch rods, spaced 7 feet apart and cased in 2½-inch pipes tie the lower front and rear wales together. The upper front wale is held in place by 1¼-inch rods, spaced 5 feet centers and cased in 2½-inch pipe.

The rear row of piles under the dock carries along its upper end two 60-pound steel rails, bedded in concrete and running the full length of the pier. These rails serve to stiffen the dock and also to tie the rear row of piles together. Resting on the rails every 7 feet is a special casting or saddle, to which the anchor rods are fastened. Each anchor rod is connected to the dock by two 1⅜-inch round rods, which extend for 12 feet into the concrete mass, terminating in a washer and nut embedded near the face of the pier.

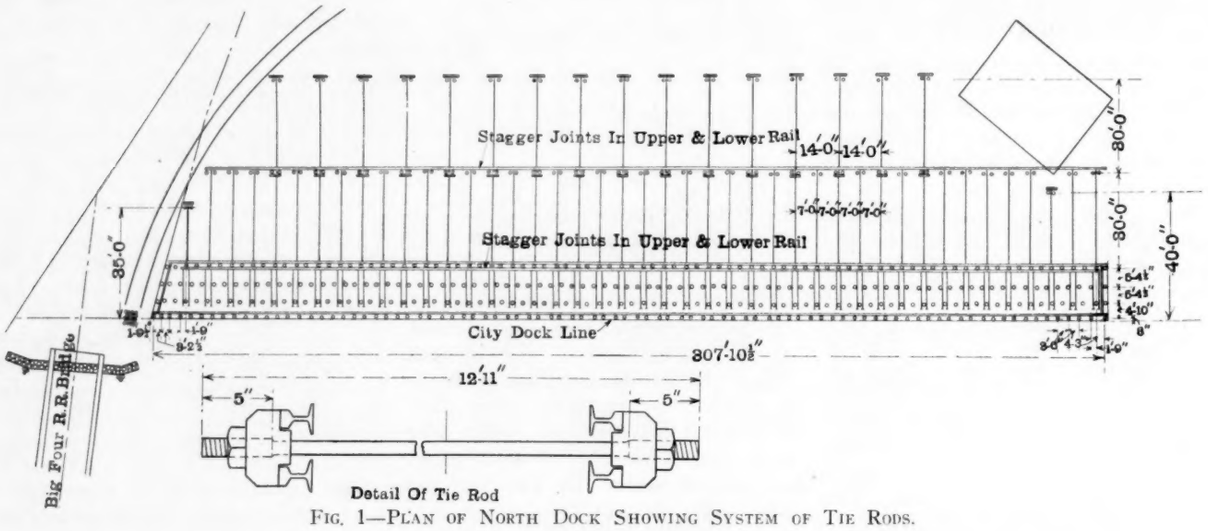

FIG. 1—PLAN OF NORTH DOCK SHOWING SYSTEM OF TIE RODS.

The dock is anchored by two rows of oak piles situated 47 and 77 feet inland from the face of the pier. The piles are driven in groups of two, the groups being spaced 7 feet and 14 feet, center to center, in the outer and inner rows, respectively. These piles are tied together with steel rails in the same manner as the rear row of piles under the dock. Two rails are used on the inner row and four on the outer row of anchor piles. The inner and outer rows are tied to each other by 1¾-inch round rods spaced 14 feet apart, while the outer row is, in its turn, tied to the dock by 1¾-inch and 2-inch rods spaced 7 feet apart. The ends of the tie rods are provided with

nuts and washers, which bear on cast iron saddles fitting over the steel rails, as is clearly shown in the accompanying illustration. The heads of both rows of anchor piles, as well as the anchor rods, are surrounded by concrete, thus forming a permanent structure.

In building the dock, the inner row of anchor piles was driven first, followed by each outer row in order until the face of the pier was reached. After the piles had been driven, the sheet piling was placed, the sand and slag filled in and the concrete laid. The proportions of the concrete mixture for the sub-aqueous work is 1:3:5, cement, sand and broken stone, respectively; for the super-aqueous work, the concrete mixture is 1:3:6.

The south dock and north dock are is now under construction, and similar in construction. This work it is expected that the dock will be completed early in September.

ORDERS RECEIVED

Indianapolis, Ind., July 20.—The Columbia Meter Co., manufacturer of electric and other meters, was reorganized last week with $10,000 capital. Stockholders and directors of the reorganized company are G. A. Schaffer, W. H. Pugh, and Thomas G. Lee. The company has been in business about two years.

Cornelius F. Fosson, secretary-treasurer of the Vincennes Pipe & Casting Co., Vincennes, has applied to the county courts for a receiver. He owns ten shares of stock in the company and asserts that directors of the company refuse to advance any more money for raw material and labor. The liabilities are about $14,350 but it is understood the assets are ample to cover them.

The Maxwell-Brisco Motor Co., Newcastle, has placed a large order for castings with the Newcastle Foundry Co., enabling that company to operate with a full force of employes and work full time. The motor company is making additions to its plant that will enable it to turn out 6,000 automobiles next season.

The Atlanta Rolling Mill & Tinplate Co., Atlanta, owned largely by Indianapolis capitalists, resumed operating last week with a full force of 236 men. The plant had been closed for about ten weeks. Some time ago operating was resumed in the plant but difficulty was experienced in getting enough material to keep the men busy. Ample material has now been obtained to keep the plant running for several weeks.

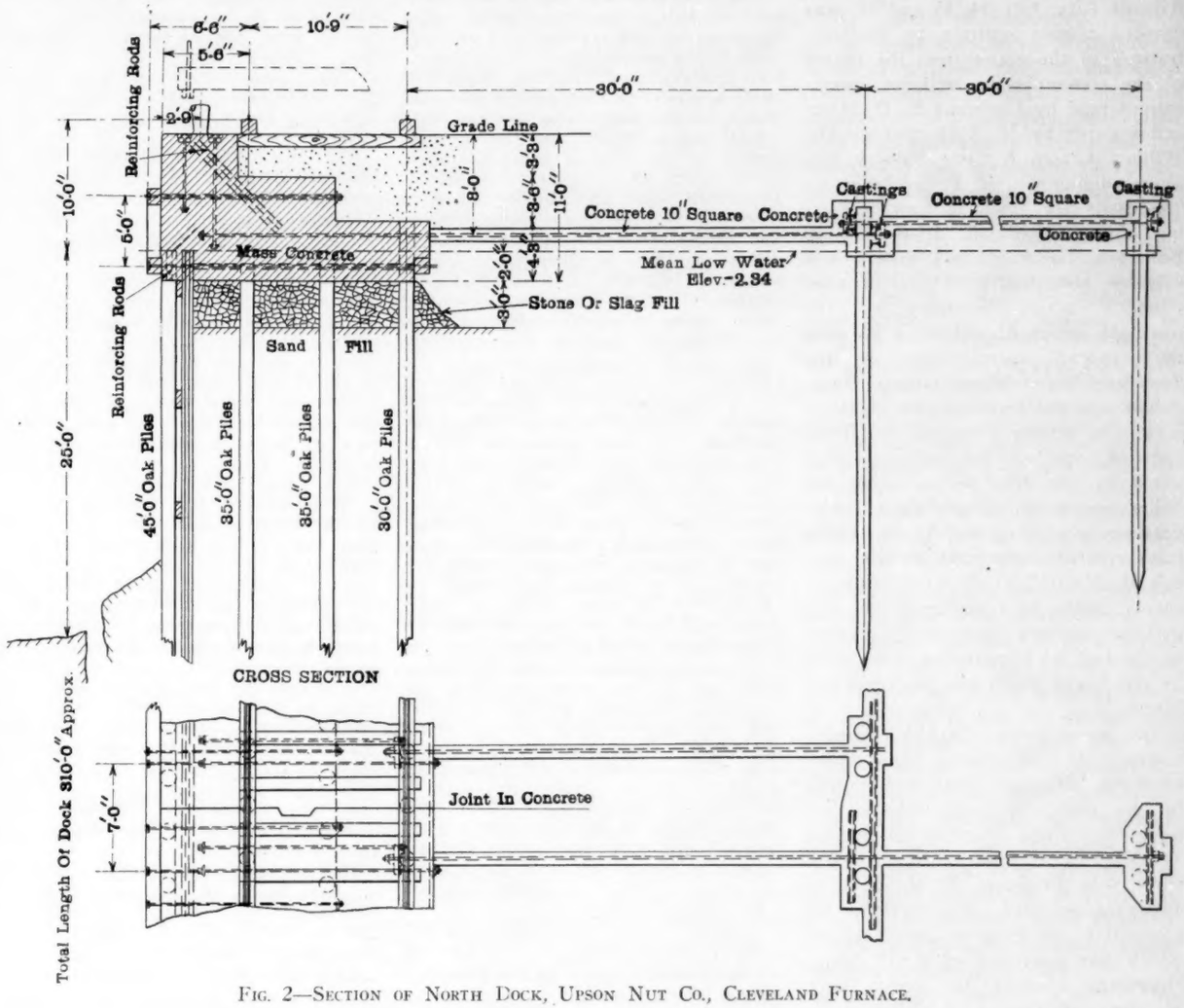

FIG. 2—SECTION OF NORTH DOCK, UPSON NUT CO., CLEVELAND FURNACE.

Col. Otto H. Falk, vice president of the Falk Mfg. Co., Milwaukee, is being prominently mentioned as a Republican candidate for governor of Wisconsin. Col. Falk is one of the well known Wisconsin iron men and is prominent in political circles.

BOILER MANUFACTURERS' CONVENTION

Weighty Reasons Given for More Rigid State and National Boiler Inspection Legislation—Steel Men Tell of Progress in Turning Out Better Material.

The opening session of the 20th annual convention of the American Boiler Manufacturers' Association, held at Atlantic City, July 14, 15 and 16, was devoted almost entirely to the two features of the convention; the report of the committee on uniform specifications read by Chairman E. D. Meier and a paper by H. J. Hartley, of the William Cramp & Sons Ship & Engine Building Co., of Philadelphia, on "Necessity for Uniform Laws Covering Construction and Inspection of Boilers." The committee report is a valuable contribution in that it contains a careful summary of the principal points of difference between the standard specifications of the American Boiler Manufacturers' Association and the provisions of the Massachusetts statute governing boiler inspection, and of the rules promulgated by the chief inspector of the boiler inspection department, who presides over the board of boiler rules created under that statute, Joseph H. McNeill. Col. Meier took occasion justly to compliment the experience and intelligent study brought to the task of formulating these rules by this board which was published last March.

The meeting was held Wednesday morning, the attendance being about as usual, although great expectations for an unusually large turnout had been entertained. In the absence of President M. F. Cole, of Newnan, Ga., First Vice President T. M. Rees, of Pittsburg, presided. The report of the committee on uniform specifications, which was composed of E. D. Meier, chairman; Thomas M. Rees, H. J. Hartley and George N. Riley, is in part as follows:

Committee's Report.

There have been two important developments growing out of the activities of this committee and the sanction of their work by previous conventions. The first of these events was the passage, in 1907, of "An Act Relative to the Operation and Inspection of Steam Boilers" by the legislature of the state of Massachusetts. The second was the appointment, by President Theodore Roosevelt, of a commission on revision of laws relating to safety of life at sea. The necessity of such a commission was first pointed out by our association in our convention at Buffalo in 1901. The appointment by President Roosevelt, of a commission of five experts to revise these laws may justly be claimed by us as the culmination of our labors.

The chairman and one of the members of this committee, being also members of the committee on uniform boiler specifications of the American Society for Testing Materials, made a report to that society June 25, 1908. In this report we confine ourselves mainly to the question of materials as the subject most pertinent to the work of the society mentioned. It appears that the board of boiler rules of the state of Massachusetts had before them our uniform specifications of 1898—as amended in 1905—and then followed them in most particulars. But in the classification of boiler plate they vary slightly from us. They also have a very carefully prepared homogeneity test. In the chemical properties they have adopted the specifications of the American Society for Testing Materials. These are decidedly too easy, as pointed out by your chairman in a report to that society. They permit slightly higher phosphorus than the American Boiler Manufacturers' Association specifications. We claimed further, that there was at present no sound reason for permitting a higher percentage of phosphorus in acid than in basic steel, and that the sulphur for all three classes of plate is too high.

The bending test in the Massachusetts law is the same as ours, except that they allow no limit of thickness, but expect plate of any thickness to be bent down double on itself. This we believe will have to be modified for very thick plates such as are used in the marine boilers. The Massachusetts rules go into much more detail than our specifications:

Iron rivets in single shear	38,000 pounds
Iron rivets in double shear	70,000 pounds
Steel rivets in single shear	42,000 pounds
Steel rivets in double shear	78,000 pounds

giving the maximum shearing strength of rivets per square inch of cross sectional area.

Important provisions in regard to the connections of safety valves in boilers are given also. Cast iron is prohibited for discs and seats, and no safety valve may exceed 5 inches in diameter. Valves are provided for on every steam outlet from a boiler, except safety valves. This is a great element of safety for boiler repairers; therefore much to be commended.

The factors of safety prescribed are somewhat higher than those of our specifications. Where ours run from 4½ to 5, the Massachusetts rules exact from 5 to 6, according to various circumstances. Boilers are rated at 3 horsepower per square foot of grate area, which is very low for present conditions of steam making, and would be true only where low grades of anthracite are used. With good bituminous coal 7 horsepower per square foot of grate area is the general practice. The hydrostatic test is fixed at 50 per cent above working pressure, as against 1/3 excess by the American Boiler Manufacturers' Association rules.

Excellent examples are given for the efficiency of joints, running as follows:

Single riveted lap joint	0.576
Double riveted lap joint	0.739
Triple riveted, double butt strap	0.829
Quadruple riveted double butt strap	0.937

The curious anomoly is seen in permitting open-hearth flange or boiler steel for the combustion chambers and furnaces, and prohibiting it for shells, drums and butt straps. This provision was explained to your chairman as being a temporary one, the intention being to eliminate open-hearth flange or boiler steel altogether from boilers, and insisting on the use of fire box and extra soft steel. Cast steel is given more prominence than it deserves, as any boiler manufacturer who has suffered loss from the porosity of steel castings will agree. But cast iron is eliminated from boiler work in a number of parts, and wrought or cast steel specified so that the best practice will soon leave wrought steel only. Pressure parts of superheaters must be steel. All boilers built or imported into the state of Massachusetts after May 1, 1908, must conform to these rules, and must be stamped "Massachusetts Standard" with a running number for each shop.

The staying of the exposed portion of flat heads of horizontal tubular boilers is very carefully prescribed, and examples given for small heads. The limit of length of a longitudinal joint is fixed at 12 feet. This is a good provision, as was shown by the tests of standard steel drums tested by your committee in Chicago in 1893.

It is well known that for the past 40 years the builders of locomotive boilers have punched their tube holes, and it is the almost universal practice to punch rivet holes for land boilers.

Your committee believes that the closest scrutiny and tests of the materials which go into the boiler are of prime importance, and that a material which has to be so gingerly treated that it cannot be punched with safety, is not fit to go into a boiler at all.

George Hartley said from the point of view of the large buyer that he had found much confusion exists as between specifications in vogue in different localities, and this resulted in

an equal confusion as between different bidders when manufacturers of different localities competed for certain work. An instance was related by one member where it had come to his ears that a competitor had asked the steel company to mark the steel one grade while selling him another. It was then explained that the steel company in question refused to do this.

Pressure Limit.

E. M. Wilkinson, of Oswego, N. Y., in connection with pressure on horizontal tubular boilers stated that in Oswego specifications had been drawn a short time ago for three boilers 84 inches diameter, 18 feet long, to carry 160 pounds working pressure. The speaker held that if the diameter is to be limited there should also be a limit placed on pressures, and that 160 pounds on a boiler of that type is exceeding the safe limit. Being asked by Mr. Scannel what was the thickness of the shells, the speaker replied that that was left to the option of the manufacturers. In his opinion such boilers should be built of plate of not exceeding ½-inch in thickness. Three years ago he had built boilers of 84 inches diameter under Hartford specifications, plates not less than 9/16 inches thick, working pressure 150 pounds. The concern for whom they were intended was not actually using over 100 pounds pressure in its other boilers, and the engines were not adapted to above that; yet the owners insisted on the new boilers being 150 pounds pressure in order that as the boilers got older they might have more leeway on inspection. As a result, the boilers having to be made in three courses, the circular seams near the bridge, the hottest part of the fire, were of such thickness, that together with the poor quality of the water used, after the boilers had been in commission six months, the plates commenced to open on the girth seam near the bridge wall, and it cost $1,100 to make necessary repairs. The pressure had to be cut down as a consequence.

Mr. Scannel asked if scale collected more quickly on ⅝-inch than ½-inch plate? The speaker replied that it would depend on conditions; he had seen scale collect more quickly on 7/16-inch than 9/16-inch.

Mr. Hartley in presenting his paper to the association said that it was not with the object of presenting anything new in the manufacture of boilers but merely to present for consideration and discussion the importance, feasibility and necessity of urging the enactment of national uniform boiler inspection laws as a compulsory means of preventing, or at least minimizing, the loss of human life and destruction of valuable property, resulting incidentally, from accidents to steam generating apparatus. The speaker said that out of 46 requests, by letter, replies were received from 39 states to the effect that they had no state laws or any legal requirements governing the inspection of boilers; 5 states have laws, 11 have inadequate provisions embodied in their factory inspection laws. But not a single state has what should be recognized as legal requirements calling for a systematic and obligatory inspection under such rules and regulations as would prove satisfactory to anyone familiar with the necessities regarding the safety of life and property from boiler accidents. That more and better laws have not been enacted is not the fault of the American Boiler Manufacturers' Association, which as far back as 1890, at its third convention, held in New York, made a report in favor of a uniform inspection law for the United States and territories. Notwithstanding that there has been up to the present time no rigorous and systematic boiler inspection federal law enacted, yet there has been a partially compelling influence through the American Boiler Makers' Association so far as its membership goes requiring in the construction of boilers the use of the most acceptable material. If this influence could be made absolutely imperative through the adoption of appropriate legislation it would deter laymen from purchasing and accepting the product of unscrupulous builders of boilers, and there would be an incentive for all boiler manufacturers to employ neither inferior material or workmanship in construction. Many of the present municipal ordinances and regulations with respect to boiler construction and maintenance are obsolete as to their requirements, and if they ever met existing conditions at the time they were originally enacted have long since ceased to represent modern practice and conditions. The method of test employed at Philadelphia was explained, and it was stated that the following particulars are obtained by the method in use there, viz.: (1) a determination of the structural strength of boiler; (2) a determination of the character of workmanship; (3) a determination of the "hidden defects," or those that cannot well be discovered by the hammer and eye test; (4) a complete and continued knowledge of the structural conditions of the boiler; all of which is recorded in the Department of Public Safety for reference, as long as the boiler is in use. As proof of the efficiency of the system, which is a self supporting one, there has not been a boiler explosion in that city of any consequence for 20 years, although there are some 8,000 boilers in use there.

Need of Inspection.

The most conclusive argument in favor of a good uniform inspection law, properly enforced, may be summed up in a paragraph, by quoting from the well known journal of the Hartford Boiler Inspection and Insurance Company, which is as follows:

From 1879 to 1907, inclusive, incomplete statistics show that there have been in the United States during that time, 8,512 boiler explosions, an average of 304 per year, the number of people killed thereby amounting to 8,433, an average of 301 per year.

The statistics for the year 1907 show the number of boiler explosions during that year to be 471; the number of people killed, 300; injured, 420, or a total of 720 people killed and injured during one year from boiler explosions.

This represents 40 more explosions in 1907 than in the year preceding, 1906.

Wednesday an informal discussion was had upon matters of general interest, which was opened by a review of the work of the association in its endeavor to obtain a higher grade of boiler plate and to reduce the sulphur contents, etc., and also giving the history of the movement for uniform inspection laws, by Colonel Meier. He especially mentioned C. M. Schwab, of the Bethlehem Steel Corporation, the especial guest of honor of the convention, as being one who had at an early date exhibited a willingness to meet the boiler manufacturers half way in their efforts to obtain a better quality of steel for boiler plate, and who had given them valuable aid in this direction. Colonel Meier, for the benefit of those new members who were not conversant with the matter gave a review briefly of the work done in influencing a revision of the marine inspection laws by the government, a matter that is now well under preparation and from which the best results are to be expected.

William L. Hirsch, representing the Carnegie Steel Co., took an active part in the discussion from the standpoint of the steel manufacturers. He complimented Colonel Meier on having borne along with other manufacturers very patiently with the steel

manufacturers, who on their part had been constantly endeavoring to improve the quality of their product. In the early days of the acid process it was found difficult to eradicate the impurities, but by the aid of chemistry and the study of experts great improvement has been accomplished, and manufacturers are ready to take forward steps constantly as fast as new developments come along that will make it possible to do so practically. This is not only desired by manufacturers to meet the demands of domestic trade but to enter fully and effectively into foreign markets.

Steel manufacturers however are not infallible, and there yet remains a large field for further inquiry and investigation which they are carrying on all the time at great expense in the hope of securing ultimately all that can be wished for. Every year advances are being made in this direction. As an illustration of the effect of heat and an understanding of its laws as applied to the manufacture of steel, the speaker said that he had seen a steel plate bent cold flat on itself without injury, and then the opposite end of the same piece heated to a cherry red and turned over flat without fracture; but the same piece of plate when subjected to about 500 degrees, Fahr., and then bent flat will crack like glass. In reply to the question as to why it was more difficult to reduce to the minimum of phosphorus and sulphur acid steel rather than basic steel, the speaker said that the acid process being a melting one, and the basic effected chemically, in the methods today employed in the basic process the phosphorus goes out with the slag, and the manufacturer is able to give the consumer basic steel with phosphorus almost nil. The sulphur is, however, still there to some extent, and will in the best practice range from 0.025 to 0.04 per cent.; and at present there seems to be no way of overcoming this ratio.

Detroit in 1909.

At the Wednesday afternoon session, Detroit was selected as next place of meeting, 1909, and the following officers elected to serve for the ensuing year: President, E. D. Meier, New York; secretary, J. D. Farasey, Cleveland; treasurer, Jos. F. Wangler, St. Louis; first vice president, T. M. Rees, Pittsburg; second vice president, J. Don Smith, Charleston, S. C.; third vice president, W. A. Brunner, Phillipsburg, N. J.; fourth vice president, H. D. McKinnon, Bay City, Mich.; fifth vice president, M. A. Ryan, Duluth.

Thursday night, at a banquet, President Meier, Charles M. Schwab, of the Bethlehem Steel Corporation, Thomas A. Dailey, J. D. Farrasey, George Slate, of *The Boiler Maker*. W. H. S. Bateman and others, spoke in response to toasts.

TESTING MATERIAL CONGRESS.

The fifth congress of the International Association for Testing Materials represented in this country by the American Society for Testing Materials, will be held in Copenhagen, Denmark, early in September, 1909. Arrangements for this congress are already actively in progress, and the indications are that it will prove the most successful in the history of the organization.

The proceedings of the congress will consist largely of official reports of standing committees and individual referees on scientific subjects relating to the testing of materials. By action of the council, non-official papers by members of the association to be presented at this congress will be restricted to the following subjects as being in the judgment of the council, of chief importance:

A. Metals.

(a) Metallography; (b) hardness testing; (c) impact tests; (d) testing metals by alternating stresses, thermal treatment, etc.; (e) testing of cast iron; (f) influence of increased temperature on the quality of metal.

B. Hydraulic Cements.

(g) Reinforced concrete; (h) progress in the methods of testing; (i) cement in sea-water; (j) constancy of volume; (k) tests by means of prisms and standard sand; (l) weathering resistance of building stones.

C. Miscellaneous.

(m) Oils, (n) caoutchouc; (o) wood; (p) paints on metallic structures.

The international association has this year begun the publication of proceedings, which will be issued at irregular intervals three or four times per annum.

For further information readers are referred to the General Secretary of the International Association, 11 Nordbahnstrasse 50, Vienna, Austria, or to Edgar Marburg, Secretary, American Society for Testing Materials, University of Pennsylvania, Philadelphia, Pa.

C. B. Eads and J. Risher are building a machine shop at Eunice, La.

ORDERS INCREASE

And Milwaukee Machinery Builders Express More Confidence in Future.

Milwaukee, Wis., July 20.—General trade of the past few weeks has been the best of the year. Machinery manufacturers are becoming more confident as orders increase and a larger output means a call for more raw material. The call for soft iron by all of the leading manufacturing plants of the city has been large and this trade has been stimulated to a certain extent by the cut in steel prices.

Indications are to be found everywhere among Milwaukee manufacturers that prosperity is returning. The Chicago, Milwaukee & St. Paul has ordered 3,500 new box cars and the locomotive and mill departments of the shops are running full time with a day and a night force. The Gerlinger Steel Casting Co. has an exceptionally full force at work and the Davis Mfg. Co. has doubled its force since Jan. 1 and is now running twenty-two hours a day. The Milwaukee Motor Co. has tripled its force since Jan. 1 and will again double it on Sept. 1. The Kearney & Trecker Machine Tool Co. has just put on a night force, and the West Allis Malleable Iron & Chain Belt Co., which closed down some weeks ago, is again in operation with a full force. Not in six months has Milwaukee had so many tangible indications of substantial business improvement in the manufacturing field as at the present time.

"We are now but three men short of the force which we had in the so-called 'height of prosperity' last year," said an official of the Gerlinger Steel Casting Co.

The J. I. Case Plow Works resumed operations on July 6 with a force of 500 men working 10 hours a day. Manufacturing conditions are returning to the normal stage in Racine and several other factories will soon resume.

The Allis-Chalmers Co. has just equipped a large manufacturing plant at Union City, Pa., with a central power house distributing three-phase, 60-cycle, 220-volt current to Allis-Chalmers induction motors driving the various equipment in the plant. Several of the motors are connected directly with circular saws without overhead machinery and gearing.

Market Reflects Reviving Confidence

Confidence in reviving business was again reflected the past week in the stock market by further price advances. Substantial aid was given by statements of leading financial and industrial authorities. Additional stimulus resulted from weekly reports of railroad earnings which exhibited smaller decreases than during May and June. The fact of moving crops of fair size commanding high prices is beginning to make itself felt. Pessimistic statements of railroad managers, gathered in New York during the week to discuss proposed freight rate advances, were practically ignored.

Continued strength of Steel common, closing Saturday at 44⅝, the highest since February, 1907, created the most discussion. Under the leadership of steel stocks, the market Monday opened dull but firm. Despite slightly reactionary movements Wednesday and Thursday due to profit taking, the market became actually buoyant Saturday, closing at the highest prices, also the highest for the year. The average price of 12 industrial stocks is now only about three points lower than at the corresponding date last year. The average price of 20 railroad stocks is 2¾ lower.

Favorable comment was made upon the improved demand for bonds, which were relatively more active than shares the latter part of the week. Much encouragement was felt at this since disappointment had followed the failure early in the month of investors to reinvest their shares of the July dividend and interest disbursements. Call money rates were easy, ranging from 1 to 1½ per cent. Gold to the amount of $1,000,000 for export to Paris was engaged. The foreign trade statement for June showed an increase in imports of $8,000,000 over May. The fortnightly bulletin on idle cars showed a decrease of about 10,000 since June 24. Commercial failures for the week were 258 compared with 246 the previous week and 177 the corresponding week last year. Bank clearings, a trifle smaller than a week ago, made a much better comparison with a year ago than have recent weeks, the decline being only 7 per cent. The bank statement was more favorable than the estimates. According to the average system, there was an increase in cash reserves of $10,103,400 and in surplus reserve of $5,097,825, bringing the total surplus to $55,228,828. Actual totals of clearing house banks showed deposits increased $13,320,100 and loans increased $8,579,000. Specie increased $3,904,800 and the percentage of reserve was 29.03, an increase of 0.6. State banks and trust companies showed increase in total deposits of $5,342,200 and loans increased but $28,300, the percentage of reserve being 36.3, an increase of 0.9. Shares to the number of 2,706,600 were dealt in, compared with 3,103,400 the preceding week, and 2,914,000 the corresponding week last year. Bonds exclusive of government bonds were dealt in to the amount of $17,944,000 compared with $14,912,000 the preceding week and $4,219,000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. July 18	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	10⅞	- ¾	Sept. 3	19,820 000			
Allis-Chalmers pr	34½	+ ⅛		16.150,000	7 cum	1¾ Q.	Feb., 1904
American Can	4¾	— ¼	Feb. 3	41 233 300			
Am. Can pr	59½	+ ⅜		41,233,300	7 cum	1¾ Q.	July, 1908
Am. Car & Foundry	58¼	+1¾	June 25	30,000,000		½ Q.	July, 1908
Am. Car & Fdy. pr	10 ⅝	+ ⅝		30.000,000	7 n. c.	1¾ Q.	July, 1908
American Loc.	51⅜	+2⅛	Oct. 20	25,000,000	5	1¼ Q.	Aug., 1908
American Loc. pr.	105	+2¾		25 000,000	7 cum	1¾ Q.	July, 1908
American Ship	41¼	—5⅛	Oct. 14	7 60 .000	4	1 Q.	June, 1908
American Ship pr	100½	.....		7,900,000	7 n. c	1¾ Q.	July, 1908
Am. Steel Foundries	8	.....	Oct. 6	15 810 000			
Am. Steel Foundries pr	41	.....		17,240.000	6 cum	2½	Aug., 1 04
Barney & Smith	50	.....	June 2	2.0 0,000	4	1 Q.	Sept., 1907
Barney & Smith pr	105	.....		2 500 000	8 cum	2 Q.	June, 1908
Bethlehem S eel	20	+3¼	April 7	14,862.000			
Bethlehem Steel pr	47¼	+1¼		14 908 000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	36	+2¼	March 17	45,000.000*	6	1½ S. A.	Aug., 1903
Cambria Iron	45	.....		8,168.000*	4	2 S. A.	April, 1908
Chicago Pneumatic Tool	25½	+2	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	31¾	+4¼	Oct. 19	34 235 500		3½	April, 1902
Crucible Steel	5½	⅜	Oct. 21	24.578 400			
Crucible Steel pr	41¼	+ ¾		24,436.500	7 cum	1 Q.	Dec., 1907
Empire Steel	8	.....	Feb. 26	1,254,770			
Empire Steel pr	45	.....		2 500,000	6 cum	3 S. A.	July, 1908
Fay & Egan	100	.....	Feb. 18	1.000,000	6	1½ Q.	May, 1908
Fay & Egan pr	110	.....		1,000 000	7 cum	1¾ Q.	May, 1908
General Electric	143¼	+7	May 12	65,167.400	8	2 Q.	July, 1908
Harbison-Walker	13	.....	Jan. 20	18,000.000		½	Oct., 1907
Harbison-Walker pr	71	.....		9,6 0,000	6 cum	1½ Q.	July, 1908
Int rnational Pump	24⅜	+1⅛	June 2	17.787 300		1	April, 1905
International Pump pr	79¾	+2¾		13,885,000	6 cum	1½ Q.	May, 1908
Lackawanna Steel	34	.....	March 11	34,971 400			
Lake Sup. Corp.	7	.....	Oct. 7	40,0 00,000			
New York Air Brake	72	+1	June 18	8 012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	120	.....	Feb. 5	8.500 000	6	1½ Q.	June, 1908
Niles-Bement-Pond pr	100	.....		2 000,000	6 cum	1½ Q.	May, 1908
Otis Elevator Co.	34	.....	March 16	6 156,600		1½ S. A.	April, 1908
Otis Elevator Co. pr	89	+1		5 449,500	6 n. c.	1½ Q	July, 1908
Penn. Steel	60	.....	May 11	10,750 000			
Penn. Steel pr	97	.....		16.5 0 400	7 n. c.	3½ S. A.	May, 1908
Pittsburg Coal Co.	12	.....	Feb. 10	28,853.400			Nov., 1906
Pittsburg Coal Co. pr	42½	.....		27,080.800	7 c.	1¾	April, 1905
Pressed Steel Car	30¾	+1¾	Feb. 19	12,500,000		3	Aug., 1904
Pressed Steel Car pr	90	+3		12.500.000	7 n c.	1¾ Q.	May, 1908
Pullman	162	+2	Nov. 11	100 000 000	8	2 Q.	May, 1908
Railway Stl. Spring	37⅛	+ ⅛	March 5	13,500.000	4	2 S. A.	April, 1908
Railway Stl Spring pr	94	.....		13,500.000	7 cum	1¾ Q.	June, 1908
Rep. Iron & Steel	18¾	+1	Oct. 21	27,191.000			
Rep. Iron & Steel pr	71½	+2¼		20,416 900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	59	+3⅛	March 11	10,000,000	6	1 Q	June, 1908
Sloss-Sheffield pr	97	.....		6,700 0 0	7 n. c.	1¾ Q.	July, 1908
U. S. Pipe & Fdy.	24	+2	June 24	12,500,000	4	1 Q.	Dec , 1907
U. S. Pipe & Fdy pr	69¼	+ ¾		12 500,000	7 n c	1¾ Q.	Sept., 1908
U. S. Steel	44⅝	+4⅞	April 20	508,304,500	2 n. c.	½ Q.	June, 1908
U. S. Steel pr	108⅜	+1⅛		360,281.100	7 cum	1¾ Q.	June, 1908
U. S. Steel 5's	101½	+2⅛		463,798.000	5	5 A.	.....
Va. Iron. Coal & Coke	54	+3½	Nov. 17	9.073 880			
WestinghouseElec	60¼	+4½	June 24	23 933.200*	10	2½ Q.	Oct , 1907
WestinghouseAir Brake	95	—1½	Oct. 6	11.000,000*		2½ Q.	July, 1908

Par value of shares, $100, except those starred (*), $50

Copper Stocks.

New York.—Amalgamated Copper closed 70⅛, a net gain of 2.

Boston.—Butte Coalition closed 25¾, a net gain of 2¾; Calumet & Arizona closed 113, a net gain of 1; Calumet & Hecla closed 660, a net loss of 5; North Butte closed 73¾, a net gain of 3⅝; Quincy Mining closed 87, a net loss of 1. Add Fin. Notes Gal 17.

Financial Notes.

The Harbison-Walker Refractories Co. has declared the regular quarterly dividend of 1½ per cent, payable July 20; the American Ship Building Co., the quarterly dividend of 1¾ per cent on preferred, payable July 15; the American Rolling Mill Co., Middletown, O., the quarterly dividend of 1½ per cent on preferred, payable July 1; the International Steam Pump Co., the quarterly dividend of 1½ per cent on preferred, payable Aug. 10; the Cambria Steel Co., the semi-annual dividend of 1½ per cent, payable Aug. 15; the Morse Twist Drill & Machine Co., of New Bedford, Mass., quarterly dividend of $2.50 a share. The directors of the Coffin Valve Co., Neponset, Mass., paid a semi-annual dividend of 3 per cent, July 1. This is the first dividend declaration for about 15 years.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Shelton Machinery Co., Seattle, Wash. has been incorporated with $25,000 capital by H. S. Shelton and R. D. Shelton.

M. C. Petitt, J. M. Scherwig, F. C. Rodgers and O. C. Dreher, with a capital of $5,000, have incorporated the Novelty Engineering Co., Cleveland.

Robert Taylor & Son, Oakland, N. Y., brass founders, have been incorporated with $10,000 capital by Uriah Taylor, George A. Myers, and Jacob Van der Clock, as above.

The Williams Foundry & Machine Co., Akron, O., has been chartered by J. K. Williams, C. Franz, J. E. Bennett, Harvey Musser and T. W. Kimber. The capital stock of the company is placed at $75,000.

The Graham Mfg. Co., Racine, Wis., manufacturer of machinery, has been incorporated with $25,000 capital by Verna B., Henry E. and Frederick W. Graham.

The Heyenga-Barkmeier Co., 100 Washington street, Chicago, has been chartered by Martin Heyenga, Martin Barkmeier and Evan J. Stover, to manufacture vehicles and harvesting machinery, with $50,000 capital.

The Armstrong-Menczer Mold & Metal Co., Kansas City Mo., has been incorporated with a capital stock of $2,000 by James Armstrong, Edward A. Menczer and A. E. Armstrong.

Articles of incorporation have been filed by the Sommer Motor Co., the Temple, Chicago, to manufacture motors and machinery. The company is capitalized at $25,000 and has these incorporators: Willis N. Baker, L. A. Sommer and Harold F. White.

Articles of incorporation have been filed by A. Geoghan & Son, Brooklyn, N. Y., to manufacture electrical machinery, motors, etc., with $15,000 capital stock. The incorporators include Anthony Geoghan, William A. Geoghan and Edward L. Geoghan, 221 Madison street, Brooklyn, N. Y.

The New York Wire Construction Co., New York City, has been incorporated to manufacture wire and brass goods with a capital of $5,000. The incorporators are: John Faybik, 204 Avenue A, New York; Adolph F. Schmitt, 3356 Hull avenue, the Bronx, and Carl W. Illig, Delawanna, N. J.

With $200,000 capital stock, the Rolled Steel Belt & Conveyer Co. has been incorporated at Dover, Del., to engage in the manufacture of steel chains, belts, buckets and conveyers. The incorporators are: Joseph C. Davis, Maplewood, N. J.; Samuel F. Clouser, Brooklyn, N. Y., and Gavin Houston, Orange, N. J.

Articles of incorporation have been filed by the Tower Engineering Co., Buffalo, to engage in the manufacture of motors, engines and electrical work, with a capital of $10,000. The company has these incorporators: Edmund J. G. Tower, Clinton W. De Groat, and William H. Stanley, Buffalo, N. Y.

A charter has been granted to the Orometal Co., New York City, to manufacture iron, steel, manganese and coke, with $150,000 capital stock. The incorporators are: Brainard Rorison, 1 Madison avenue; Delos C. Mellen, 2,465 Broadway; Elias A. de Lima, 24 State street, all of New York City.

The Builders' Hoist & Machine Co., has filed application for a charter to manufacture hoisting engines and machinery, with $20,000 capital. The incorporators are Joseph P. Casey, 215 West 142nd street; Peter A. Gage, 235 East Sixty-first street, both of New York, and Hamilton J. Chapman, Rutherford, N. J.

The General Stamping & Mfg. Co., New York City, has been granted a charter to manufacture stamped metal articles, with a capital of $10,000. Charles M. Ams, 33 Hamilton Terrace, Godfrey P. Schmid, 1327 Chisholm street, both of New York City, and Julius Brenzinger, Mt. Vernon, N. Y., are the incorporators.

The Progress Brass Fitting Co., New York City, has been incorporated for the purpose of manufacturing metal fittings for chandeliers, fixtures or plumbing work, with $3,000 capital. The incorporators are Nachman Angel, 242 East 110th street; Simon Israel, 141 Norfolk street and Levi Samuels, 20 West 112th street, all of New York City.

The Power Equipment Co., New York City, has been chartered to manufacture engines, boilers, machinery, electric work, with a capital of $25,000. The company has these incorporators: Leopold A. Camachio, St. Marks place, New Brighton, N. Y.; Gustavus A. Conover, 20 West Third street, Bayonne, N. J., and Arthur M. Mayer, 87 Hamilton place, New York City.

New Construction:—

The recent increase of the capital stock of the Fowler Nail Co., Seymour, Conn., has been made to cover extensions and improvements at the plant, some of which have already been made and others are in course of construction.

The Western Steel Car & Foundry Co., Chicago, announces that next month it will let the contract for additions and enlargements to the Burnham, Ill., plant that will entail the expenditure of $250,000 and double the capacity of the plant.

The Syleecau Mfg. Co., Rock Hill, S. C., machinist, advises respecting the destruction of its foundry by fire, June 23, that the company is erecting a brick building in its place 40 x 60 feet, which is about completed, and that it is now in the market for new equipment.

The increase of the capital stock of the Union Foundry Co., Anniston, Ala., from $100,000 to $200,000 has been subscribed and the plant will be enlarged immediately. The plan of the improvements will make it one of the largest soil pipe and fittings foundries in the south, its capacity being over 20,000 tons.

Plans are being completed by G. C. Bowman and A. H. Lanwehr for doubling the capacity of the Holland Furnace Co., Holland, Mich. According to the plans, the addition will be as large as the present building. On April 23 of the present year, one of its departments was nearly destroyed by fire, but was immediately rebuilt.

Businessmen in Charleston, Ill., are undertaking to raise stock subscriptions of $25,000 to rebuild the Charleston stove foundry on a larger scale than ever, with modern buildings and equipment. The former manager, J. W. Ramsey, has submitted a proposition to the business men looking to the incorporation of the company with a capital stock of $40,000.

The American Shipbuilding Co. will erect a new boiler shop 150 x 350 feet, at its Lorain, O., plant, removing the boiler shop from the Globe yards, Cleveland. The company is said to be contemplating entering the bridge material and stationary engine field at the Lorain plant to provide work in the slack shipbuilding season, but nothing definite has been decided as yet.

Before the foundry building of the Southern Car Mfg. & Supply Co.,

Chattanooga, Tenn., was completed, a contract was let to the Virginia Bridge Co. for an 80-foot extension to cost $15,000. With the addition, the main building of the new plant will be 122 x 240 feet, costing $50,000, not including machinery. It is expected that operating will be begun about Sept. 1.

The National Wire & Iron Fence Works, Houston, Tex., is looking for a suitable location to erect a mill for rolling scrap iron and rails, into bars, as well as manufacturing cotton ties, railroad spikes, nails, etc. At present, the plant manufactures barbed wire fencing, etc. The capital stock of the company will be increased from $40,000 to $100,000 to cover the proposed improvements.

The structural work for the new foundry that the United States Steel Corporation is building at McKeesport, Pa., has been put up, and the bricklayers are now working on the walls. The machine, blacksmith, pattern, foundry and other shops of the corporation in McKeesport are being placed between Walnut and Locust streets, the old tapping and threading departments are being removed, and the pattern shop is to be extended to Locust street.

The Manitowoc Aluminum Foundry Co., Manitowoc, Wis., at the annual meeting, July 6, voted to increase its capital stock from $50,000 to $100,000, and authorized the erection of additional buildings to its plant to accommodate a brass and bronze working department, which will be included in the future operations of the plant. Conrad Werra was reelected president and manager, and Miss Jennie Dempsey was chosen secretary and treasurer of the company.

The National Machinery Co., Tiffin, O., manufacturer of bolt, nut, rivet and wire nail machinery, advises that the changes which it expects to make will double the capacity of the machine shop. In addition to adding 50 per cent to the shop's length, there will be a new center bay constructed to the present shop which will be equipped with electric cranes. The power will be changed from steam to electric and necessary improvements added to double the output.

The Wambold-Brunchweiler Co., Milwaukee, brass founder and supply agent, recently removed to Milwaukee from Appleton, Wis., has leased a factory site for a period of ten years at Lisbon avenue and Thirtieth street, where a foundry, finishing shop and offices will be erected. The new building will be of frame construction, 48 x 100 feet, and will cost $10,000. There will be 12,000 square feet of floor space in the new structure. It will be completed by Oct. 1.

Officers of the Carterville-United Iron Works, Carterville and Webb City, Mo., have been inspecting the site at Miami, Mo., upon which it is proposed to establish a branch plant of the iron works. Work on the new plant is to begin at once.

Carl Hartman has purchased the present shop and adjoining property of the Straubel Machine Co., Green Bay, Wis., and has plans for building a new shop adjoining the old one. The building will be of brick, 32 by 80 feet and one story.

The Crane Co., Chicago, has instructed architects to draw plans for its proposed new building at South Second and South West streets, Salt Lake City, Utah, to cost $55,000. The building will be three stories but with walls of sufficient thickness to permit of three stories being added. The main structure will be 84 x 100 feet and a shed 25 x 165 feet will be built in which to store pipe, rails, etc.

The Moline Malleable Iron Co., Fox, Ill., is rebuilding its boiler plant to permit of the boiler being fired by heat from the furnaces. The company is now employing a full force of men and is assuming its old time air of prosperity.

Excavation has been commenced by contractors for the proposed storage yard of the Youngstown Sheet & Tube Co., at Struthers, O. The land about the new furnace will be cut down four to six feet to make room for the ore bins.

General Industrial:—

The Chicago Iron Store Co. has increased its capital stock from $25,000 to $250,000.

The Eagle Machinery & Mfg. Co., Chicago, has increased its capital stock from $5,000 to $25,000.

Notice of the voluntary dissolution of the Wabash Foundry & Machine Co. has been filed at Indianapolis.

The Thomas D. West foundry at Sharon, Pa., which has been idle for several weeks, resumed operating July 13.

The Milwaukee Steel Fence Post Co., Milwaukee, has amended its incorporation articles, enlarging the scope of its business and changing its name to the Milwaukee Steel Post Co.

The Dubuque & Lake Superior Mining Co., Superior, Wis., has amended its charter, increasing the number of directors from five to seven.

The work of rebuilding the big heating furnace of the La Belle mill at Wheeling, W. Va., has been completed, and the entire plant is operating.

The Cadillac Machine Co., Cadillac, Mich., is building five steel trusses weighing two tons each, for use in the new manual training building at the Mt. Pleasant normal school.

The Hellerton Slag Co. is erecting a crusher on the cinder dump of the Thomas Iron Co., Catasauqua, Pa. The cinder dump, which has been growing since 1869, covers 70 acres and is over 30 feet high.

The Standard Aluminum Co., Two Rivers, Wis., has been organized by the former owner of the business, Adolph Kummerow, for many years foreman in the plant of the Two Rivers Aluminum Mfg. Co., at Two Rivers.

The Vilter Mfg. Co., Milwaukee, Wis., has been awarded the contract for installing a 100-ton ice making plant for the National Capitol City Brewing Co., Washington, D. C., also contracts for supplying gas washers to the Cincinnati gas works.

The Brown & Sharpe Mfg. Co., Providence, R. I., machinist, has posted a notice that the entire plant will be closed down July 31 to Aug. 31, with the exception of two departments which will take care of special orders for the first two weeks.

The King & Walker Machine Co., Madison, Wis., advises respecting its recent fire that it expects to rebuild, but that plans have not yet been decided upon. The company has enough contract work to keep busy a year, and is anxious to go into operation as soon as possible.

The Carroll Yielding Barb Wire Co., Peoria, Ill., is undertaking to find a new location in the north or west for a new factory. President Frank T. Carroll has the matter in charge. Among the cities so far in correspondence with the company are: Des Moines, Ia.; Kansas City, Mo., and Detroit, Mich.

The American Metals Recovery Co. was recently incorporated at Wilmington, Del., to manufacture, buy, sell and generally deal in iron, steel, tin, manganese and like materials. The incorporators named are F. R. Hansell, George H. B. Martin, S. C. Seymour, all of Philadelphia. The company's capital stock is placed at $100,000.

The Pitt Enginering Co., 401 Dearborn street, Chicago, which was recently incorporated, proposes to furnish, install and repair elevator machinery, both passenger and freight,

paying particular attention to the remodeling of electric elevators, replacing mechanical with modern controllers. The company has established a shop at the address given above.

The Moran Co., Seattle, Wash., ship builder, engineer and founder, announces that the daily press report to the effect that this company would increase its facilities for carrying on the work of steel construction to the extent that the company intended to enter into competition with the larger steel corporations, was not authorized, was incorrect and absurd.

The stockholders of the Wilmington Iron Co., Wilmington, Del., at the annual meeting, some days ago, elected the following officers and directors: President, C. H. Zender; vice president and general manager, J. G. Hempsted; treasurer, Michael Black; secretary and assistant treasurer, H. C. McFarland; the personnel of the directors being the same as that of the officers.

The Vulcan Iron Works, Mason City, Ia., structural iron, flexible tools and machines, has increased its business to such a point, under the management of President Ira Knapp that it has increased the capital stock from $15,000 to $30,000. F. E. Wheeler, of Clear Lake, Ia., has taken $5,000 of the increase in stock, and has been chosen secretary of the company, removing to Mason City.

The Standard Brass & Iron Works, Milwaukee, Wis., brass founder and machinist, recently incorporated, announces that it will conduct mainly a general jobbing business, continuing the business previously carried on for the past eight years. It will manufacture brewers' goods, plumbers' and other specialties. It is not erecting any new buildings or installing any new machinery.

E. Killing's Molding Machine Works, Davenport, Ia., announces that it has under construction a foundry 50 x 125 feet, but is not in the market for additional equipment, as the machinery now being used in the old foundry will be used in the new. It is proposed to make its own castings mostly, but later also will do general jobbing, making a specialty of sash weights molded with its own machines.

The United States Malleable Iron Co., Toledo, O., has been incorporated under Ohio laws with a capital of $100,000, by E. C. Hagener, Walter H. Jeffrey, Clark A. Browning, Robert C. Pew and Robert G. Bacon. The company has been doing business for three years under a West Virginia charter, which it surrendered to become an Ohio concern. The company manufactures malleable iron castings.

The Evangeline Iron Works, Evangeline, La., has purchased the Union Iron Works in the oilfield for $11,000. J. F. Raney, who has been manager for the Oil Well Supply Co., Jennings, La., will be the manager of the new concern.

The Duplex Shear Lock Co., Cleveland, whose incorporation was noted last week, advises that it will manufacture a patented device for attaching shear arms to bars for reinforced concrete construction work. No special machinery will be required, as it is expected to do the work in the shops of the Duplex Hanger Co., which are equipped for this class of work.

Fires:—

The roof of the Federal company's machine shops and dry rooms, Wardner, Ida., was damaged by fire July 9.

The factory of the New Galilee Stove Co., New Galilee, Pa., was damaged by fire to the extent of $5,000, July 8.

The Fisher Foundry, at Macomb, Ill., sustained a small loss by fire caused by the combustion of gases in the japanning room.

A loss of about $1,000 was sustained by the Glazier Stove Co., Chelsea, Mich., through a fire which started in building No. 3.

The pattern shop of the King Iron Works, 226 Ohio street, Buffalo, N. Y., was slightly damaged by fire July 8. The plant was insured to cover the loss.

Sayre Bros. foundry, Phoebus, Va., was badly damaged July 9, the fire having been caused by a hot casting coming in contact with woodwork. The loss is estimated at $25,000, insurance, $5,000.

The plant of the Stockham Pipe & Fittings Co., Birmingham, Ala., was damaged to the extent of $15,000 July 11.

The wooden building of the Canadian Foundry, J. Rheaume proprietor, at Carriere street Mile End, Montreal, was destroyed July 9, the loss being placed at $5,000.

Trade Notes:—

The Pittsburg Steel Supply Co. has been appointed agents for the Pittsburg district representing the American Steam Gauge & Valve Mfg. Co., Boston. The officers of the Pittsburg Steel Supply Co. are all experienced men with a thorough knowledge of the requirements of the Pittsburg manufacturing concerns. J. B. Kane, who has been several years in the plant of the American company has been assigned to the New York branch as salesman. C. S. Kiessling, formerly in the general offices, has been transferred to the Chicago office in charge of the order department.

The Gas Machinery Co., Cleveland, announces that the Wile producers, heretofore furnished by the Wile Power Gas Co., will be hereafter exclusively manufactured and sold by the Gas Machinery Co. J. H. Wile will be the sales manager of the Wile producer department.

TRADE PUBLICATIONS.

ALLAN METAL.—A. Allan & Son, New York, Bulletin No. 1, 6 x 9 inches, 16 pages, describes the evolution, manufacture and uses of the anti-friction metal made by this concern.

HOISTING MACHINERY. — The Brown Hoisting Machinery Co., Cleveland, has recently issued a booklet describing the special application of "Brownhoist" machinery to artificial gas, coke and electric lighting plants. It contains numerous illustrations of coal handling apparatus in gas and electric plants situated in all parts of the country. Data of special interest to central station engineers are given.

PULVERIZERS.—The Jeffrey Mfg. Co., Columbus, catalog No. 31A, 6 x 9 inches, 79 pages. It contains a list of the users of Jeffrey pulverizers, and numerous illustrations and descriptions of various types of pulverizers, shredders, particularly designed for coal, limestone, dry bone and gypsum crushing plants. Tables giving the dimensions and capacity of the various pulverizers are included.

FANS.—The Massachusetts Fan Co., Watertown, Mass., 1908 catalog, 3 x 6 inches, 15 pages. Pulley fans and many types of electric fans driven by standard motors of various makes are illustrated and described.

CONVEYING AND TRANSMISSION MACHINERY.—The Reuter-Jonds Mfg. Co., St. Louis, catalog G-6, 6 x 9 inches, 515 pages. Complete descriptions and illustrations of all types of mill machinery, belt conveyor idlers, chain elevators, conveyors of various types, hoists, gearing, power transmission machinery, mill, elevator, factory and mine supplies are found in this book. It is carefully indexed, and contains many valuable tables relating to power transmission. The appendix contains original rules for determining size and speed of pulleys and gears, the horsepower of gears, horsepower and dimensions of frictions and the power transmitted by steel shafting, leather belting, link belts, etc. Machinery for the entire power transmission of a factory will be found listed in this extensive catalog.

FIRE BRICK.—The Ashland Fire Brick Co., Ashland, Ky., has issued a booklet original in design, detailing the evolution of its process of making fire brick. The text is written in a breezy style, and the pamphlet is well worth the attention of every furnace man. Illustrations of Ashland liners and a table of comparative analyses conclude the pamphlet.